NEMA Contactors & Starters

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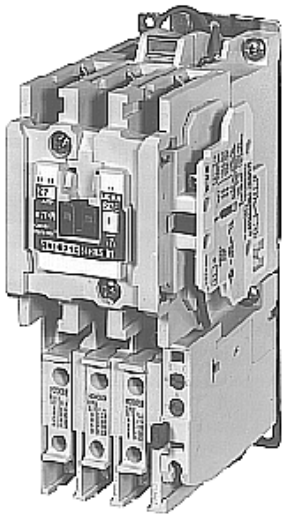
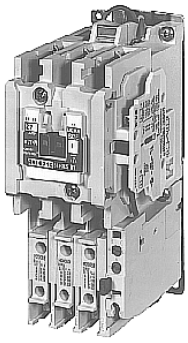


NEMA Size 1 Starter



NEMA AN16DN0AB
NEMA Size 1

Product Description

The "Freedom Series" starters and contactors listed in this catalog feature a compact, space-saving design, using state-of-the-art technology and the latest in high strength, impact and temperature resistant insulating materials. Starters and contactors are available in two rating/configuration styles — NEMA (National Electrical Manufacturers Association) and IEC (International Electrotechnical Commission). See Category 34 for IEC Rated Contactors & Starters.

The NEMA devices are sized based on traditional NEMA classifications and the IEC devices on international ratings. Internationally rated starters and contactors, as compared to NEMA devices, generally are physically down-sized to provide higher ratings in a smaller package. However, electrical load/life ratings are correspondingly reduced. Careful consideration should be given to the selection of the proper device for a specific application. Parameters, such as type of load, severity of duty, electrical load/life cycles required, etc., must be evaluated before choosing either the IEC or NEMA designs. Since the IEC devices are typically smaller than the equivalent NEMA device, there is a cost advantage over the NEMA starters and contactors.

Application Description

The Freedom to Choose the Right Product for the Application

Cutler-Hammer has been supplying quality industrial control products for more than 100 years — the Freedom Series of Contactors and Starters continue in this tradition. They offer something no other electrical control line in the world can — the Freedom to choose contactors and starters designed to either NEMA or IEC standards from one family. There are many difficult choices to be made today in matching electrical control to a specific application, but the Cutler-Hammer Freedom Series makes it easy.

Features

Freedom Family

- A single family of contactors and starters suitable for application in both the IEC and NEMA markets. "Two lines, One family" — the best of both worlds.
- Adjustable Bimetallic Ambient Compensated Overload relays with interchangeable heater packs — available in three basic sizes, covering applications up to 900 hp — reducing the number of different contactor/overload relay combinations that have to be stocked. Fixed heater overloads are optional.
- A full line of snap-on accessories common to both IEC and NEMA devices — top and side mounted auxiliary contacts, solid-state and pneumatic timers, etc.
- Straight-through wiring — line lugs at top, load lugs at bottom.
- Horizontal or vertical mounting on upright panel for application freedom.
- Screw type power terminals have captive, backed-out self-lifting pressure plates with ± screws — reduced wiring time.
- Accessible terminals for easy wiring. Optional fingerproof shields available to prevent electrical shock.
- Top located coil terminals convenient and readily accessible. 45 mm contactor magnet coils have three terminals, permitting either top or diagonal wiring — easy to replace European or U.S. style starters or contactors without changing wiring layout.
- Encapsulated dual voltage/frequency magnet coils — permanently marked with voltage, frequency and part number. NEMA Sizes 00 – 0 have non-encapsulated coils as standard.
- Designed to meet or exceed NEMA, UL, CSA, IEC, VDE, BS and other international standards and listings.
- American engineering — built by Eaton Corp./Cutler-Hammer, using the latest in statistical process control methods to produce high quality, reliable products.

Freedom NEMA

Freedom NEMA contactors and starters are designed to NEMA standards and are extremely rugged products and built for any application. Their long electrical/mechanical life is extended through easy maintainability.

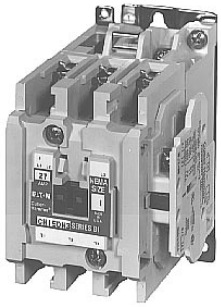
- Meets and exceeds all NEMA, UL and CSA standards.
- Sized based on standard NEMA classifications.
- Designed and built for a variety of demanding applications.
- Easy coil change and inspectable/replaceable contacts.
- Adjustable/interchangeable heater packs for flexibility.
- Available in Open and NEMA 1, 3R, 4/4X and 12 enclosures.

The Best Keeps Getting Better

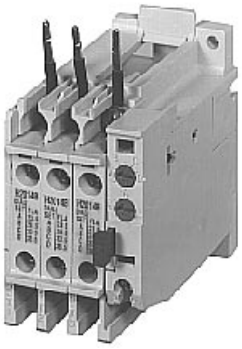
Within this catalog you will discover many enhancements to the Cutler-Hammer contactor and starter product line. These enhancements demonstrate Cutler-Hammer's commitment to continuous product improvement and total quality. A few of the Freedom Series product improvements are listed below.

What's Changing

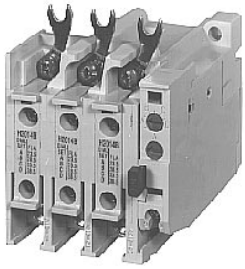
In addition, all side and top auxiliary contacts have been revised with CENELEC markings; IEC contactors to 900 hp/460V are now available; and a new line of IEC fixed heater starters is being introduced: AE17/57.



New 65 mm Contactor



New Series B1 32A Overload



New Series B1 75A Overload

Freedom Enhancements

Accessible Power Terminations to Facilitate Installation

The 65 mm contactor housing has been completely redesigned to open up the line/load terminal access area, allowing better visibility when wiring. This also aids in maintenance. IP20 fingerproofing is available through add-on shields. This change affects NEMA Sizes 1 and 2.

Load Lugs on Overload Relay Base

The load lugs have been moved from the heater pack housing to the sensor base of the 32A and 75A overload relays. This permits wiring of the starter prior to heater pack installation. These overload relays are used on NEMA Sizes 00 – 2 and 5 – 8.

New Auxiliary Contact Markings

CENELEC EN50012 — All auxiliary contact blocks are identified by a two-digit contact configuration code. Auxiliary contact terminals are also identified by a two-digit number in accordance with International Standards approved by CENELEC.

New Auxiliary Contact Ratings

All side and top auxiliary contact blocks are now rated NEMA/UL P300 DC ratings and IEC 947 AC-15/DC-13 ratings.

New Class 10 and 20 Heater Packs

Because of improvements in the overload relays, the Class 10 and 20 interchangeable heater packs have been modified. They can be used with the new overload relays (Series B1) directly or with the existing relays (Series A1) when using an adapter lug kit.

Easy Magnet Coil Change

The 65 mm contactor and the connections on the 45 and 65 mm starters have been modified to allow easy coil changes at the distributor or in the field.

Standards and Certifications

- Standard: Designed to meet or exceed UL, NEMA, IEC, CSA, VDE and BS.
- UL listed: UL File #E1491, Guide #NLDX — Open and NEMA 1, 4, 12 Enclosed
- CSA Certified: CSA File #LR353, Class #321104 Open and NEMA 1 Enclosed
- IEC: IEC 947-4-1, Sizes 6 – 8; IEC 158; IEC 947 Pending

Certified Type 2 Coordination

Cutler-Hammer Freedom Series IEC starters and NEMA starters are now UL Certified to achieve IEC 947 Type 2 coordination against 100,000A short circuit fault currents. Any brand of properly selected fuse can be used. Type 2 coordination means that the starter will be suitable for further use following a short circuit fault.

ISO 9000 Certification

When you turn to Cutler-Hammer Products, you turn to quality. The International Standards Organization (ISO) has established a series of standards acknowledged by 91 industrialized nations to bring harmony to the international quest for quality. The ISO certification process covers 20 quality system elements in design, production and installation that must conform to achieve registration. This commitment to quality will result in increased product reliability and total customer satisfaction.

Short Circuit Protection

Fuses and **Inverse-Time Circuit Breakers** may be selected per Article 430, Part D of the National Electrical Code to protect motor branch circuits from fault conditions. If higher ratings or settings are required to start the motor, do **not** exceed the maximum as listed in Exception No. 2, Article 430-52.

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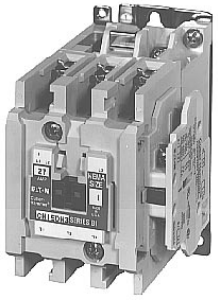
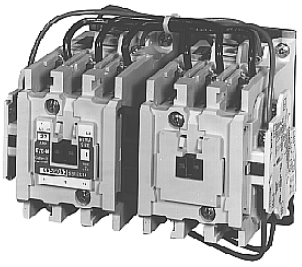


NEMA Size 1 — Cat. No. CN15DN3AB

Product Description

Non-reversing

Contactors are most commonly used to switch motor loads in applications where running overcurrent protection is either not required or is provided separately. Contactors consist of a magnetically actuated switch which can be remotely operated by a push-button station or pilot device such as a proximity switch, limit switch, float switch, auxiliary contacts, etc.



NEMA Size 1
Cat. No. CN55DN3AB

Reversing

Reversing contactors are used primarily for reversing single- or three-phase motors in applications where running overcurrent protection is either not required or is provided separately. They consist of two contactors mechanically and electrically interlocked to prevent line shorts and energization of both contactors simultaneously.

Features

- Designed specifically for use in applications requiring NEMA ratings. Contactors meet or exceed NEMA standards ICS 2-1993.
- Long life twin break, silver cadmium oxide contacts — provide excellent conductivity and superior resistance to welding and arc erosion.
- Designed to 3,000,000 electrical operations at maximum hp ratings up through 25 hp at 600V.
- Steel mounting plate standard on all open type contactors.

Non-reversing

- Holding circuit contact(s) supplied as standard:
  - Sizes 00 – 3 have NO auxiliary contact block mounted on right hand side (on Size 00, contact occupies 4th power pole position — no increase in width).
  - Sizes 4 – 5 have a NO contact block mounted on left side.
  - Sizes 6 – 7 have a 2NO/2NC contact block on top left.
  - Size 8 has a NO/NC contact block on top left back and a NO contact block on top right back.

Reversing

- One NO-NC side mounted interlock supplied as standard on each contactor for Sizes 00 – 8.

Technical Data

Table 33-1. Wire (75°C) Sizes — AWG or kcmil — Open and Enclosed

NEMA Size	Power Terminals Line or Load	Control Terminals Cu Only
00	12 – 16 stranded; 12 – 14 solid Cu	12 – 16 stranded 12 – 14 solid
0	8 – 16 stranded; 10 – 14 solid Cu	
1	8 – 14 stranded or solid Cu	
2	3 – 14 (upper) and/or 6 – 14 (lower) stranded or solid ① Cu	
3	1/0 – 14 Cu/Al	
4	250 mcm – 6	
5	750 kcmil – 2, or (2) 250 kcmil – 3/0 Cu/Al	
6	(2) 750 kcmil – 3/0 Cu/Al	
7	(3) 750 kcmil – 3/0 Cu/Al	
8	(4) 750 kcmil – 4/0 Cu/Al	

① Two compartment box lug.

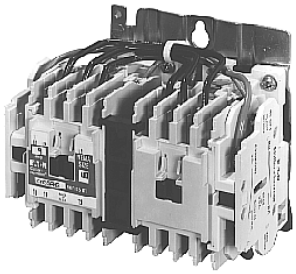
Table 33-2. Plugging and Jogging Service Horsepower Ratings ②

NEMA Size	200V	230V	460V	575V
00	—	1/2	1/2	1/2
0	1-1/2	1-1/2	2	2
1	3	3	5	5
2	7-1/2	10	15	15
3	15	20	30	30
4	25	30	60	60
5	60	75	150	150
6	125	150	300	300

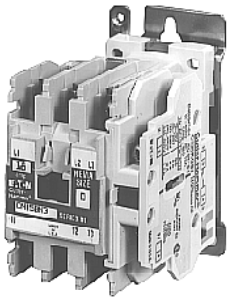
② Maximum horsepower where operation is interrupted more than 5 times per minute or more than 10 times in a 10 minute period. NEMA standard ICS 2-1993 table 2-4-3.

Kits and Accessories

- Auxiliary Contacts, contactor mounted — **Pages 33-19** – **33-20**.
- Transient Suppressor, for magnet coil — **Pages 33-17**.
- Timers — Solid-State and Pneumatic, mount on contactor — **Page 33-16**.



NEMA Size 00
3-Pole Contactor
Cat. No. CN55AN3AB



NEMA Size 0
3-Pole Contactor
Cat. No. CN15BN3AB

NEMA Size 3
3-Pole Contactor
Cat. No. CN15KN3A

Product Selection — 3-Pole Contactors

Table 33-3. Type CN15/CN55 NEMA Contactors — 3-Pole Non-reversing and Reversing

NEMA Size	Continuous Ampere Rating	Maximum UL Horsepower ①									
		1-Phase		3-Phase				3-Pole		3-Pole	
		115V	230V	208V	240V	480V	600V	Non-reversing	Price U.S. $	Reversing	Price U.S. $
00	9	1/3	1	1-1/2	1-1/2	2	2	**CN15AN3_B**	155.	**CN55AN3_B**	402.
0	18	1	2	3	3	5	5	**CN15BN3_B**	195.	**CN55BN3_B**	482.
1	27	2	3	7-1/2	7-1/2	10	10	**CN15DN3_B**	228.	**CN55DN3_B**	555.
2	45	3	7-1/2	10	15	25	25	**CN15GN3_B**	414.	**CN55GN3_B**	1,050.
3	90			25	30	50	50	**CN15KN3_**	675.	**CN55KN3_**	1,735.
4	135			40	50	100	100	**CN15NN3_**	1,610.	**CN55NN3_**	4,320.
5	270			75	100	200	200	**CN15SN3_**	3,495.	**CN55SN3_**	7,780.
6	540			150	200	400	400	**CN15TN3_B**	9,540.	**CN55TN3_B**	19,590.
7	810			200	300	600	600	**CN15UN3_**	13,600.	**CN55UN3_**	27,660.
8 ②	1215			400	450	900	900	**CN15VN3_**	21,410.	**CN55VN3_**	39,790.

① Maximum horsepower rating of starters for 380V 50 Hz applications:

NEMA Size	00	0	1	2	3	4	5	6	7	8
Horsepower	1-1/2	5	10	25	50	75	150	300	600	900

② Common control. For separate 120V control, insert letter **D** in 7th position of listed Catalog Number. EXAMPLE: CN15VN**D**3C.

Magnet Coils — AC and DC

Contactor coils listed in this section also have a 50 Hz rating as shown in the adjacent table. Select required contactor by Catalog Number and replace the magnet coil alpha designation in the Catalog Number (_) with the proper Code Suffix from the adjacent table.

For Sizes 00 – 2, the magnet coil alpha designation will be the next to the last digit of the listed Catalog Number. EXAMPLE: For a 380V, 50 Hz coil, change CN15AN3_B to CN15AN3**L**B. For all other sizes, the magnet coil alpha designation will be the last digit of the listed Catalog Number.

For **DC Magnet Coils**, see Accessories, **Pages 33-21** – **33-22**.

Table 33-4. AC Suffix Code

Coil Volts and Hertz	Code Suffix
120/60 or 110/50	**A**
240/60 or 220/50	**B**
480/60 or 440/50	**C**
600/60 or 550/50	**D**
208/60	**E**
277/60	**H**
208 – 240/60 ③	**J**
240/50	**K**
380 – 415/50	**L**
550/50	**N**
24/60, 24/50 ④	**T**
24/50	**U**
32/50	**V**
48/60	**W**
48/50	**Y**

③ NEMA Sizes 00 and 0 only.
④ NEMA Sizes 00 and 0 only. Sizes 1 – 8 are 24/60 only.

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Dimensions ..... **Pages 33-26** – **33-27**
Special Modifications ..... **Page 33-23**
Accessories..... **Pages 33-15** – **33-23**
Discount Symbol..... **1CD1**

Product Selection — 2-, 4- and 5-Pole Contactors

Table 33-5. Type CN15 NEMA Contactors — 2-, 4- and 5-Pole Non-reversing

NEMA Size	Continuous Ampere Rating	Maximum UL Horsepower						Non-reversing					
		1-Phase (2-Pole)		3-Phase									
		115V	230V	208V	240V	480V	600V	2-Pole	Price U.S. $	4-Pole	Price U.S. $	5-Pole	Price U.S. $
00	9	1/3	1	1-1/2	1-1/2	2	2	**CN15AN2_B**	135.	**CN15AN4_B**	174.	**—**	—
0	18	1	2	2	3	5	5	**CN15BN2_B**	174.	**—**	—	**—**	—
1	27	2	3	7-1/2	7-1/2	10	10	**CN15DN2_B**	207.	**CN15DN4_B**	281.	**CN15DN5_B**	354.
2	45	3	7-1/2	10	15	25	25	**CN15GN2_B**	388.	**CN15GN4_B**	545.	**CN15GN5_B**	810.
3	90			25	30	50	50	**CN15KN2_**	625.	**—**	—	**—**	—
4	135			40	50	100	100	**CN15NN2_**	1,490.	**—**	—	**—**	—
5	270			75	100	200	200	**CN15SN2_**	3,215.	**—**	—	**—**	—
6	540			150	200	400	400	**CN15TN2_B**	8,170.	**—**	—	**—**	—

NEMA Size 2
5-Pole Contactor
Cat. No. CN15GN5AB

Magnet Coils — AC or DC

Select required starter by Catalog Number and replace the magnet coil alpha designation in the Catalog Number (_) with the proper Code Suffix from the adjacent table.

For Sizes 00 – 2, the magnet coil alpha designation will be the next to the last digit of the listed Catalog Number. EXAMPLE: For a 380V, 50 Hz coil, change CN15BN3_B to CN15BN3**L**B. For all other sizes, the magnet coil alpha designation will be the last digit of the listed Catalog Number.

For **DC Magnet Coils**, see Accessories, **Pages 33-21** – **33-22**.

Table 33-6. AC Suffix Code

Coil Volts and Hertz	Code Suffix
120/60 or 110/50	**A**
240/60 or 220/50	**B**
480/60 or 440/50	**C**
600/60 or 550/50	**D**
208/60	**E**
277/60	**H**
208 – 240/60 ①	**J**
240/50	**K**
380 – 415/50	**L**
550/50	**N**
24/60, 24/50 ②	**T**
24/50	**U**
32/50	**V**
48/60	**W**
48/50	**Y**

① NEMA Sizes 00 and 0 only.
② NEMA Sizes 00 and 0 only. Sizes 1 – 8 are 24/60 only.

Technical Data ..... **Pages 33-12** – **33-14**
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Discount Symbol **1CD1**

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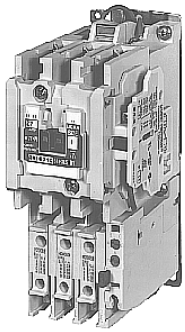
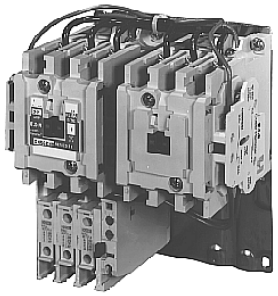


NEMA Size 1 — Cat. No. AN16BN0AB

Product Description

Non-reversing

Three-phase, full voltage magnetic starters are most commonly used to switch AC motor loads. Starters consist of a magnetically actuated switch (contactor) and an overload relay assembled together.



NEMA Size 1 — Cat. No. AN56DN0AB

Reversing

Three-phase, full voltage magnetic starters are used primarily for reversing of 3-phase squirrel cage motors. They consist of two contactors and a single overload relay assembled together. The contactors are mechanically and electrically interlocked to prevent line shorts and energization of both contactors simultaneously.

Features

- Bimetallic Ambient Compensated Overload relays — available in three basic sizes covering applications up to 900 hp — reducing number of different contactor/overload relay combinations that have to be stocked.

  These overload relays feature:
  - ❑ Selectable Manual or Automatic Reset operation.
  - ❑ Interchangeable heater packs adjustable ±24% to match motor FLA and calibrated for 1.0 and 1.15 service factors. Heater packs for smaller overload relay will mount in larger overload relay — useful in derating applications such as jogging.
  - ❑ Load lugs built into relay base.
  - ❑ Single-phase protection, Class 20 or Class 10 trip time.
  - ❑ Overload trip indication.
  - ❑ Electrically isolated NO-NC contacts (pull RESET button to test).
- Long life twin break, silver cadmium oxide contacts — provide excellent conductivity and superior resistance to welding and arc erosion. Generously sized for low resistance and cool operation.
- Designed to 3,000,000 electrical operations at maximum hp ratings up through 25 hp at 600V.
- Steel mounting plate standard on all open type starters.
- Wired for separate or common control.

Non-reversing

- Holding circuit contact(s) supplied as standard:
  - ❑ Sizes 00 – 3 have a NO auxiliary contact block mounted on right-hand side (on Size 00, contact occupies 4th power pole position — no increase in width).
  - ❑ Sizes 4 – 5 have a NO contact block mounted on left side.
  - ❑ Sizes 6 – 7 have a 2NO/2NC contact block on top left.
  - ❑ Size 8 has a NO/NC contact block on top left back and a NO on top right back.

Reversing

- Each contactor (Size 00 – 8) supplied with one NO-NC side mounted contact block as standard. NC contacts are wired as electrical interlocks.

Technical Data

Table 33-7. Wire (75°C) Sizes — AWG or kcmil — NEMA Sizes 00 – 2 — Open and Enclosed

NEMA Size	Wire Size ② Cu Only
Power Terminals — Line	
00	12 – 16 AWG stranded, 12 – 14 AWG solid
0	8 – 16 AWG stranded, 10 – 14 AWG solid
1	8 – 14 AWG stranded or solid
2	3 – 14 AWG (upper) and/or 6 – 14 AWG (lower) stranded or solid ①
Power Terminals — Load — Cu Only (stranded or solid)	
00 – 0	14 – 6 AWG stranded or solid
1 – 2	14 – 2 AWG stranded or solid
Control Terminals — Cu Only	
12 – 16 AWG stranded, 12 – 14 AWG solid	

① Two compartment box lug.
② Minimum per NEC. Maximum wire size: Sizes 00 and 0 to 8 AWG and Sizes 1 – 2 to 2 AWG.

Table 33-8. Wire (75°C) Sizes — AWG or kcmil — NEMA Sizes 3 – 8 — Open and Enclosed

NEMA Size	Wire Size ③
Power Terminals — Line and Load	
3	1/0 – 14 AWG Cu/Al
4	Open — 3/0 – 8 AWG Cu; Enclosed — 250 kcmil — 6 AWG Cu/Al
5	750 kcmil — 2 AWG; or (2) 250 kcmil — 3/0 AWG Cu/Al
6	(2) 750 kcmil — 3/0 AWG Cu/Al
7	(3) 750 kcmil — 3/0 AWG Cu/Al
8	(4) 750 kcmil — 1/0 AWG Cu/Al
Control Terminals — Cu Only	
12 – 16 AWG stranded, 12 – 14 AWG solid	

③ Minimum per NEC. Maximum wire size: Sizes 00 and 0 to 8 AWG and Sizes 1 – 2 to 2 AWG.

Table 33-9. Plugging and Jogging Service Horsepower Ratings ④

NEMA Size	200V	230V	460V	575V
00	—	1/2	1/2	1/2
0	1-1/2	1-1/2	2	2
1	3	3	5	5
2	7-1/2	10	15	15
3	15	20	30	30
4	25	30	60	60
5	60	75	150	150
6	125	150	300	300

④ Maximum horsepower where operation is interrupted more than 5 times per minute, or more than 10 times in a 10 minute period. NEMA Standard ICS2-1993 table 2-4-3.

Wiring Diagrams

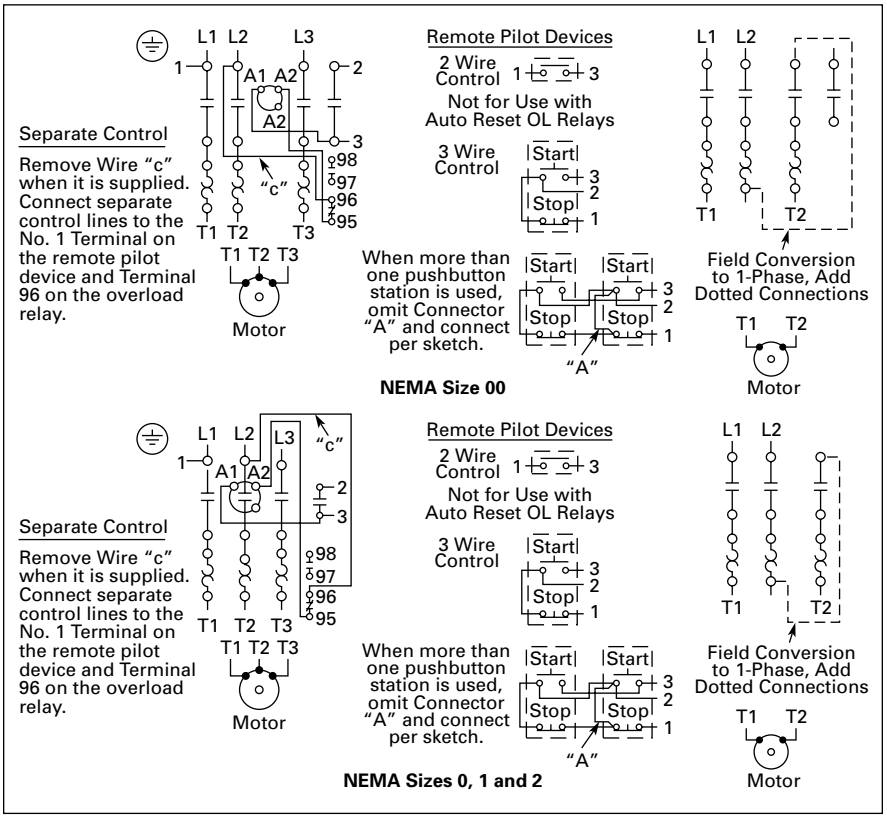
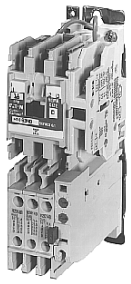

L1 L2 L3
A1 A2
Separate Control
Remove Wire "c" when it is supplied. Connect separate control lines to the No. 1 Terminal on the remote pilot device and Terminal 96 on the overload relay.
"c"
98
97
96
95
T1 T2 T3
Motor
Remote Pilot Devices
2 Wire Control
Not for Use with Auto Reset OL Relays
3 Wire Control
Start
Stop
When more than one pushbutton station is used, omit Connector "A" and connect per sketch.
"A"
Field Conversion to 1-Phase, Add Dotted Connections
NEMA Size 00
NEMA Sizes 0, 1 and 2

Figure 33-1. Typical Wiring Diagrams — Three-Phase and Single-Phase Applications

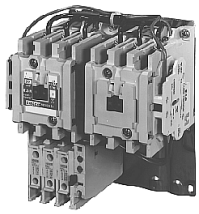
Product Selection

When Ordering Supply

- Catalog Number
- Heater pack number (see selection table, **Pages 33-36** – **33-37** or full load current.



Size 0
Non-reversing Starter



Size 1
Reversing Starter

Size 3 Vertical
Reversing Starter

Table 33-10. Type AN16/AN56 NEMA — Manual or Automatic Reset Overload Relay — Non-reversing and Reversing

NEMA Size	Continuous Ampere Rating	Service-Limit Current Rating ② (Amperes)	Maximum UL Horsepower ①										
			1-Phase		3-Phase				3-Pole	Price U.S. $	3-Pole	Vertical Reversing	Price U.S. $
			115V	230V	208V	240V	480V	600V	Non-reversing		Reversing		
00	9	11	1/3	1	1-1/2	1-1/2	2	2	**AN16AN0_C**	182.	**AN56AN0_C**	—	435.
0	18	21	1	2	3	3	5	5	**AN16BN0_C**	228.	**AN56BN0_C**	**AN56BNV0_**	515.
1	27	32	2	3	7-1/2	7-1/2	10	10	**AN16DN0_B**	262.	**AN56DN0_B**	**AN56DNV0_**	585.
2	45	52	3	7-1/2	10	15	25	25	**AN16GN0_B**	476.	**AN56GN0_B**	**AN56GNV0_**	1,110.
3	90	104	—	—	25	30	50	50	**AN16KN0_**	775.	**AN56KN0_**	**AN56KNV0_**	1,835.
4	135	156	—	—	40	50	100	100	**AN16NN0_**	1,760.	**AN56NN0_**	**AN56NNV0_**	4,475.
5	270	311	—	—	75	100	200	200	**AN16SN0_B**	4,300.	**AN56SN0_B**	—	8,590.
6	540	621	—	—	150	200	400	400	**AN16TN0_C**	9,930.	**AN56TN0_C**	—	19,990.
7	810	932	—	—	200	300	600	600	**AN16UN0_B**	14,160.	**AN56UN0_B**	—	28,995.
8 ③	1215	1400	—	—	400	450	900	900	**AN16VN0_B**	22,010.	**AN56VN0_B**	—	42,614.

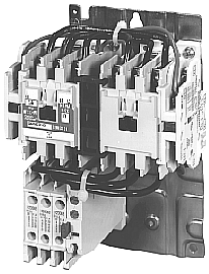
Note: Starter Catalog Numbers do not include heater packs. Select one carton of three heater packs. Heater pack selection, **Pages 33-36** – **33-37**.

① Maximum horsepower rating of starters for 380V 50 Hz applications:

NEMA Size	00	0	1	2	3	4	5	6	7	8
Horsepower	1-1/2	5	10	25	50	75	150	300	600	900

② The service-limit current ratings represent the maximum rms current, in amperes, which the controller shall be permitted to carry for protracted periods in normal service. At service-limit current ratings, temperature rises shall be permitted to exceed those obtained by testing the controller at its continuous current rating. The current rating of overload relays or trip current of other motor protective devices used shall not exceed the service-limit current rating of the controller.

③ Common control. For separate 120V control, insert letter **D** in 7th position of listed Catalog Number. EXAMPLE: AN56VN**D**0CB.



NEMA Size 0
Cat. No. AN56BN0AC

Magnet Coils — AC or DC

Starter coils listed in this section also have a 50 Hz rating as shown in the adjacent table. Select required starter by Catalog Number and replace the magnet coil alpha designation in the Catalog Number (_) with the proper Code Suffix from the adjacent table.

For Sizes 00 – 2 and 5 – 8, the magnet coil alpha designation will be the next to last digit of the listed Catalog Number. EXAMPLE: For a 380V, 50 Hz coil, change AN16BN0_C to AN16BN0**L**C. For all other sizes, the magnet coil alpha designation will be the last digit of the listed Catalog Number.

For **DC Magnet Coils**, see Accessories, **Pages 33-21** – **33-22**.

Table 33-11. AC Suffix Code

Coil Volts and Hertz	Code Suffix
120/60 or 110/50	**A**
240/60 or 220/50	**B**
480/60 or 440/50	**C**
600/60 or 550/50	**D**
208/60	**E**
277/60	**H**
208 – 240/60 ④	**J**
240/50	**K**
380 – 415/50	**L**
550/50	**N**
24/60, 24/50 ⑤	**T**
24/50	**U**
32/50	**V**
48/60	**W**
48/50	**Y**

④ NEMA Sizes 00 and 0 only.

⑤ NEMA Sizes 00 and 0 only. Sizes 1 – 8 are 24/60 only.

Technical Data. . . . . **Pages 33-12** – **33-14**
Dimensions . . . . . **Pages 33-28** – **33-30**
Special Modifications . . . . . **Page 33-23**
Accessories . . . . . **Pages 33-15** – **33-23**
Heater Packs . . . . . **Pages 33-36** – **33-37**
Discount Symbol **1CD1**

Catalog Number AN700BN0218
NEMA Size 0, Open Type
Two-Speed, Reconnectable
(One-Winding)

Catalog Number AN700DN0218
NEMA Size 1, Open Type
Two-Speed, Reconnectable Winding
(One-Winding)

Catalog Number AN700DN022
NEMA Size 1, Open Type
Two-Speed, Two-Winding
Separate Winding) Wye-Wye Motor

Product Selection

When Ordering Specify

For 2-Speed Selective Control:

- Catalog Number plus magnet coil Code Suffix. Example: Size 0 — AN700BN022**B.**
- Heater pack number or full load current for each speed.

For 2-Speed other than Selective Control:

- Catalog Number plus magnet coil Code Suffix and option required. Example: AN700BN022B except Compelling.
- Heater pack number or full load current for each speed.

Note: 2-speed starters are designed for starting and controlling both separate (2-winding) and reconnectable (1-winding) motors. Separate winding, WYE-WYE motors have a separate winding for each speed. Reconnectable, consequent pole motors use the same winding for both speeds. All standard starters are wired for selective control.

Table 33-12. Product Selection — 2-Speed — Selective Control — Separate Winding ①

Maximum Horsepower — 60/50 Hertz								NEMA Size	Open Type	
Constant or Variable Torque				Constant Horsepower					Catalog Number	Price U.S. $
115V	200V	230V	460V/575V	115V	200V	230V	460/575V			
1-1/2	3	3	5	1	2	2	3	0	**AN700BN022**	710.
3	7-1/2	7-1/2	10	2	5	5	7-1/2	1	**AN700DN022**	795.
—	10	15	25	—	7-1/2	10	20	2	**AN700GN022**	1,380.
—	25	30	50	—	20	25	40	3	**AN700KN022**	2,145.
—	40	50	100	—	30	40	75	4	**AN700NN022**	5,370.
—	75	100	200	—	60	75	150	5	**AN700SN022**	12,730.

Prices of starters do not include heater packs. Select 2 packs (2 overload relays, one for each speed). Heater pack selection, **Pages 33-36 – 33-37.**

① If branch circuit protective device is 45A or greater, C320FBR1 fuse kit(s) may be required for circuit protection per NEC 530-072.

Table 33-13. Product Selection — 2-Speed — Selective Control — Reconnectable Winding ②

Maximum Horsepower — 60/50 Hertz								NEMA Size	Open Type		
Constant or Variable Torque				Constant Horsepower					Constant or Variable Torque	Constant Horsepower	Price U.S. $
115V	200V	230V	460V/575V	115V	200V	230V	460/575V		Catalog Number	Catalog Number	
1-1/2	3	3	5	1	2	2	3	0	**AN700BN0218**	**AN700BN0219**	1,005.
3	7-1/2	7-1/2	10	2	5	5	7-1/2	1	**AN700DN0218**	**AN700DN0219**	1,080.
—	10	15	25	—	7-1/2	10	20	2	**AN700GN0218**	**AN700GN0219**	1,910.
—	25	30	50	—	20	25	40	3	**AN700KN0218**	**AN700KN0219**	2,865.
—	40	50	100	—	30	40	75	4	**AN700NN0218**	**AN700NN0219**	7.790.

Prices of starters do not include heater packs. Select 2 packs (2 overload relays, one for each speed). Heater pack selection, **Pages 33-36 – 33-37.**

② If branch circuit protective device is 45A or greater, C320FBR1 fuse kit(s) may be required for circuit protection per NEC 530-072.

Table 33-14. Magnetic Coils — AC or DC

Coil Voltage and Hz	Code Suffix	Coil Voltage and Hz	Code Suffix	Coil Voltage and Hz	Code Suffix
120/60 or 110/50	**A**	277/60	**H**	24/60, 24/50 ③	**T**
240/60 or 220/50	**B**	208 – 240/60	**J**	24/50	**U**
480/60 or 440/50	**C**	240/50	**K**	32/50	**V**
600/60 or 550/50	**D**	380 – 415/50	**L**	48/60	**W**
208/60	**E**	550/50	**N**	48/50	**Y**

③ NEMA Sizes 00 and 0 only. Sizes 1 – 5 are 24/60 only.

Dimensions ..... **Page 33-31**
Discount Symbol **1CD1**

NEMA Size 1 — Cat. No. BN16DN0AB

Product Description

Single-phase, full voltage magnetic starters connect the motor directly across the line, allowing it to draw full inrush current during start-up. These starters are most commonly used for control of self-starting single-phase motors up to 15 horsepower at 230V. They consist of a 2-pole electromagnetic contactor to make and break the motor power circuit and an overload relay to provide running overload protection. Starters listed in the table include:

- Two-pole Freedom Series contactor with long life twin break, silver cadmium oxide contacts. Generously sized for low resistance and cool operation. Designed to 3 million electrical operations at maximum hp and 30 million mechanical operations to Size 0, 10 million operations to Size 2 and 6 million operations to Size 3.
- Three-pole Freedom Series overload with poles 2 and 3 wired in series for motor overload protection. This overload is ambient compensated, selectable Manual or Automatic reset, interchangeable Class 10 or 20 heater packs, 1.0 or 1.15 service factor selectability, overload trip indication and electrically isolated NO-NC contacts (pull RESET button to test).
- Holding circuit NO auxiliary contact supplied as standard. On Size 00, the contact occupies the 4th power pole position. Sizes 0 – 3 have the NO auxiliary mounted on the right side of the contactor.
- Steel mounting plate as standard on all open type starters. Wired for separate or common control.

Wiring Diagrams

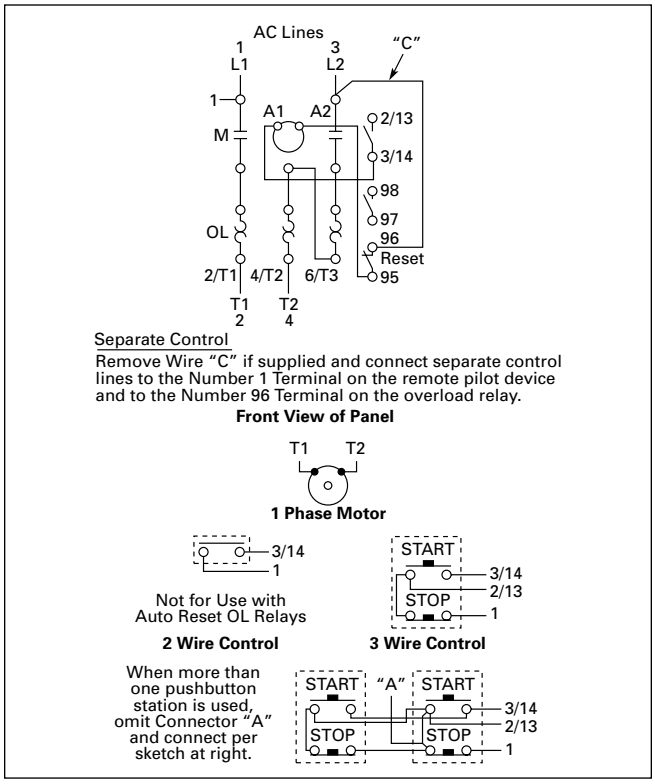


Figure 33-2. Typical Wiring Diagrams — Single-Phase Applications

Product Selection

When Ordering Specify

- Catalog Number
- Heater Pack Number (see selection table, **Pages 33-36 – 33-37**) or full load current.

Table 33-15. Type BN16 NEMA — Manual or Automatic Reset Overload Relay

NEMA Size	Maximum Horsepower		Magnet Coil Voltage (60 Hz)	Open Type 2-Pole	
	Motor Voltage	1-Phase		Catalog Number	Price U.S. $
00	115	1/3	120 ①	**BN16AN0AC**	182.
	230	1	240	**BN16AN0BC**	182.
0	115	1	120 ①	**BN16BN0AC**	204.
	230	2	240	**BN16BN0BC**	204.
1	115	2	120 ①	**BN16DN0AB**	239.
	230	3	240	**BN16DN0BB**	239.
1P	115	3	120 ①	**BN16PN0AB**	311.
	230	5	240	**BN16PN0BB**	311.
2	115	3	120 ①	**BN16GN0AB**	432.
	230	7-1/2	240	**BN16GN0BB**	432.
3	115	7-1/2	120 ①	**BN16KN0A**	675.
	230	15	240	**BN16KN0B**	675.

Note: Starter Catalog Numbers do not include heater packs. Select 1 carton of 3 heater packs. Heater pack selection, **Pages 33-36 – 33-37.**

① For separate 120V control circuit. For maximum hp at listed motor voltages, use the rating of other starters of same size.

Accessories . . . . . **Pages 33-15 – 33-23**
Discount Symbol **1CD1**

Table 33-16. Coil Data Notes

P.U.	Pick-up time is the average time taken from closing of the coil circuit to main contact touch.
D.O.	Drop-out time is the average time taken from opening of the coil circuit to main contact separation.
Cold	Coil data with a cold coil.
Hot	Coil data with a hot coil.

All data is based on a standard contactor with no auxiliary devices and a 120V AC or 24V DC magnet coil. Coil data has a ±5% range depending on the application, therefore specific data may vary.

Table 33-17. Specifications — Sizes 00 – 3

Description	Contactor Catalog Number/Size				
	CN15A NEMA Size 00	**CN15B NEMA Size 0**	**CN15D NEMA Size 1**	**CN15G NEMA Size 2**	**CN15K NEMA Size 3**
Configuration					
Number of Poles	2, 3, 4	2, 3	2, 3, 4, 5	2, 3, 4, 5	2, 3
Auxiliary Contacts, Standard	4th Pole NO (1)	Side NO (1)	Side NO (1)	Side NO (1)	Side NO (1)
Add-On Auxiliary Contacts	Top (4) or Side (4)	Top (4) or Side (3)	Top (4) or Side (3)	Top (4) or Side (3)	Left Side (4) or Right Side (3)
Frame Size	45 mm	45 mm	65 mm	65 mm	90 mm
Maximum Voltage Rating	600V AC	600V AC	600V AC	600V AC	600V AC
Continuous Ampere Ratings (I)	9A	18A	27A	45A	90A
Maximum Horsepower (hp)					
1-Phase 115V	1/3	1	2	3	7-1/2
230V	1	2	3	7-1/2	15
3-Phase 200V	1-1/2	3	7-1/2	10	25
230V	1-1/2	3	7-1/2	15	30
460V	2	5	10	25	50
575V	2	5	10	25	50
AC Magnet Coil Data					
Pick-Up Volts — Cold	74%	74%	74%	74%	72%
Pick-Up Volts — Hot	78%	78%	78%	78%	76%
Pick-Up Voltamperes	80	100	230	230	390
Pick-Up Watts	49	65	95	95	112
Sealed Voltamperes	7.5	10	28	28	49.8
Sealed Watts	2.4	3.1	7.8	7.8	13
Drop-Out Volts — Cold	45%	45%	49%	49%	50%
Drop-Out Volts — Hot	46%	46%	50%	50%	52%
Maximum Operation Rate — Ops/Hour	12,000	12,000	12,000	12,000	7,200
Pick-Up Time (mS)	12	12	20	20	14
Drop-Out Time (mS)	12	12	14	14	11
Coil Operating Range % of Rated Voltage	-15% to +10%	-15% to +10%	-15% to +10%	-15% to +10%	-15% to +10%
DC Magnet Coil Data	For DC Magnet Coils (and coil data), see Accessories, **Pages 33-21 – 33-22.**				
Operating Temperature	-20° to 65°C	-20° to 65°C	-20° to 65°C	-20° to 65°C	-20° to 65°C
Maximum Operating Altitude (ft.)	6,000	6,000	6,000	6,000	6,000
Mechanical Life	20,000,000	20,000,000	10,000,000	10,000,000	6,000,000
Electrical Life (480V/60 Hz)					
AC-3	4,000,000	3,000,000	5,000,000	3,500,000	1,700,000
AC-4	90,000	85,000	200,000	62,000	80,000
Wire Range					
Power Terminals	12 – 16 stranded, 12 – 14 solid Cu	8 – 16 stranded, 10 – 14 solid Cu	8 – 14 stranded or solid Cu	2 – 14 (upper) and/or 6 – 14 (lower) stranded or solid Cu	1/0 – 14 Cu
Control Terminals	12 – 16 stranded, 12 – 14 solid Cu	12 – 16 stranded, 12 – 14 solid Cu	12 – 16 stranded, 12 – 14 solid Cu	12 – 16 stranded, 12 – 14 solid Cu	12 – 16 stranded 12 – 14 solid Cu
Power Terminal Torque Line and Load — lb-in	7	15	20	40 (14 – 8 AWG) 45 (6 – 4 AWG) 50 (3 AWG)	35 (14 – 10 AWG) 40 (8 AWG) 45 (6 – 4 AWG) 50 (3 – 1/0 AWG)
Contact Kit Part Number	None	None	6-65-2	6-65-8	6-43-2
Auxiliary Contact Rating	A600, P300				

Table 33-18. Specifications — Sizes 4 – 8

Description	Contactor Catalog Number/Size				
	CN15N NEMA Size 4	**CN15S NEMA Size 5**	**CN15T NEMA Size 6**	**CN15U NEMA Size 7**	**CN15V NEMA Size 8**
Configuration					
Number of Poles	2, 3	2, 3	3	3	3
Auxiliary Contacts, Standard	Side NO (1)	Side NO (1)	Top left 2NO/2NC (1)	Top left 2NO/2NC (1)	Side 2NO/NC (1)
Add-On Auxiliary Contacts	Left side (3) or Right side (4)	Left side (3) or Right side (4)	Top right 2NO/2NC (1)	Top right 2NO/2NC (1)	NO/NC (2)
Frame Size	180 mm	180 mm	280 mm	280 mm	334 mm
Maximum Voltage Rating	600V AC	600V AC	600V AC	600V AC	600V AC
Continuous Ampere Ratings (I)	135A	270A	540A	810A	1215A
Maximum Horsepower (hp)					
1-Phase 115V	—	—	—	—	—
230V	—	—	—	—	—
3-Phase 200V	40	75	150	200	400
230V	50	100	200	300	450
460V	100	200	400	600	900
575V	100	200	400	600	900
AC Magnet Coil Data					
Pick-Up Volts — Cold	72.5%	75%	75%	75%	75%
Pick-Up Volts — Hot	76%	77%	75%	75%	75%
Pick-Up Voltamperes	1158	1158	1600	1600	2450
Pick-Up Watts	240	240	1345	1345	2060
Sealed Voltamperes	100	100	25	25	75
Sealed Watts	27.2	27.2	22	22	60
Drop-Out Volts — Cold	54%	63%	①	①	①
Drop-Out Volts — Hot	56%	64%	①	①	①
Maximum Operation Rate — Ops/Hour	2,400	2,400	N/A	N/A	N/A
Pick-Up Time (mS)	28	25	105	105	70
Drop-Out Time (mS)	14	13	200	200	50
Coil Operating Range % of Rated Voltage	-15% to +10%	-15% to +10%	-15% to +10%	-15% to +10%	-15% to +10%
DC Magnet Coil Data	For DC Magnet Coils (and coil data), see Accessories, **Pages 33-21 – 33-22**.				
Operating Temperature	-20° to 65°C	-20° to 65°C	-20° to 65°C	-20° to 65°C	-20° to 65°C
Maximum Operating Altitude (ft.)	6,000	6,000	6,000	6,000	6,000
Mechanical Life	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000
Electrical Life (480V/60 Hz)					
AC-3	800,000	500,000	590,000	450,000	420,000
AC-4	70,000	34,000	7,400	5,000	4,200
Wire Range					
Power Terminals	Open — 3/0 – 8 Cu; Enclosed — 250 kcmil – 6 Cu/Al	750 kcmil — 2 or (2) 250 kcmil – 3/0 Cu/Al	(2) 750 kcmil – 3/0 Cu/Al	(3) 750 kcmil – 3/0 Cu/Al	(4) 750 kcmil – 1/0 Cu/Al
Control Terminals	12 – 16 stranded, 12 – 14 solid Cu	12 – 16 stranded, 12 – 14 solid Cu	12 – 16 stranded, 12 – 14 solid Cu	12 – 16 stranded, 12 – 14 solid Cu	12 – 16 stranded, 12 – 14 solid Cu
Power Terminal Torque Line and Load — lb-in	200	550	550	550	500
Contact Kit Part Number	6-44-2	6-45-2	6-601	6-613	6-571
Auxiliary Contact Rating	A600, P300				

① 20 – 30% of rated coil voltage.

Electrical Life — AC-3 and AC-4 Utilization Categories

33

Life Load Curves

Cutler-Hammer's Freedom Series NEMA contactors have been designed and manufactured for superior life performance in any worldwide application. All testing has been based on requirements as found in NEMA and UL standards and conducted by Cutler-Hammer. Actual application life may vary depending on environmental conditions and application duty cycle.

Utilization Categories

AC-1 — Non-inductive or slightly inductive loads, such as resistance furnaces and heating.

AC-2 — Starting of slip-ring motors.

AC-3 — Squirrel cage motors; starting, switching off motors during running.

AC-4 — Squirrel cage motors; starting, plugging, inching or jogging.

Note: AC-3 tests are conducted at rated device currents and AC-4 tests are conducted at six times rated device currents. All tests have been run at 460V, 60 Hz.

Contactor Choice

- Decide what utilization category your application is and choose the appropriate curve.
- Locate the intersection of the life-load curve of the appropriate contactor with the applications operational current (Ie), as found on the horizontal axis.
- Read the estimated contact life along the vertical axis in number of operational cycles.

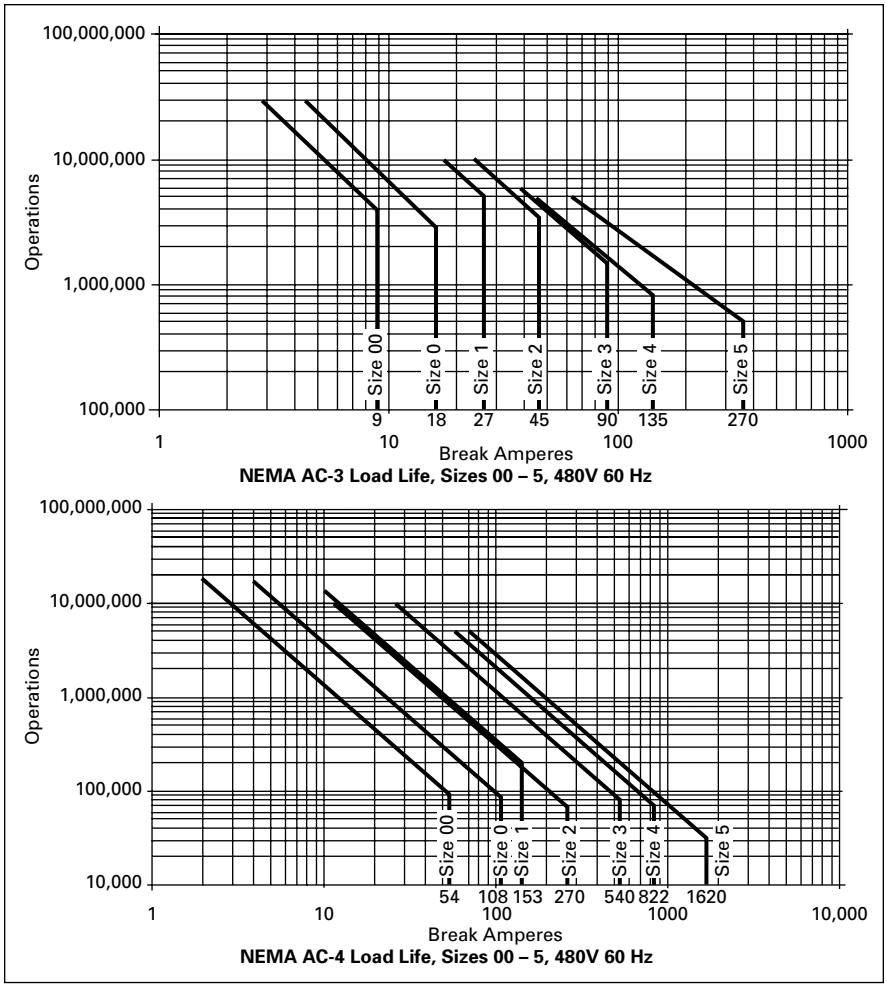
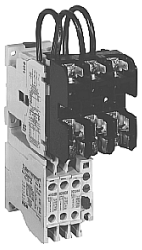


Figure 33-3. AC-3 and AC-4 Utilization Categories

3-Pole Top Mounted Fuse Block Kit

IEC Sizes A – K, NEMA Sizes 00 – 2



Field mount to Freedom Series starters and contactors. Designed to save space and reduce installation costs. They provide short circuit protection for branch circuits.

Mounted Fuse Block Kit

Table 33-19. Fuse Block Kits

Fuse Type	Catalog Number	Price U.S. $
Class H — 30A 250V	**C350KH21**	64.00
Class R — 30A 250V	**C350KR21**	74.50
Class G — 15A 300V	**C350KG37**	81.00
Class G — 20A 300V	**C350KG38**	81.00
Class G — 30A 300V	**C350KG31**	81.00
Class G — 60A 300V	**C350KG32**	121.00
Class T — 30A 300V	**C350KT31**	81.00
Class T — 60A 300V	**C350KT32**	93.50
Class J — 30A 600V	**C350KJ61**	104.00
Class J — 60A 600V	**C350KJ62**	121.00
Type M — 30A 600V ①	**C350KM61**	64.00
Class CC — 30A 600V	**C350KC63**	64.00
Class T — 30A 600V	**C350KT61**	93.50
Class T — 60A 600V	**C350KT62**	104.00

① Type M fuse block not approved for branch circuit protection.

Table 33-20. Approximate Dimensions

Fuse Block			Dimensions in Inches (mm)			
Class	Amperes	Volts	Wide A	High B	Deep C	D
G	15, 20, 30	300	2.40 (61.0)	3.00 (76.2)	2.04 (51.8)	—
	60	300	2.62 (66.5)	4.25 (108.0)	2.08 (52.8)	—
H	30	250	3.00 (76.2)	3.10 (78.7)	2.23 (56.6)	3.62 (91.9)
J	30, 60	600	4.81 (122.2)	4.12 (104.6)	2.82 (71.6)	—
M, CC	30	600	2.40 (61.0)	3.00 (76.2)	2.04 (51.8)	—
R	30	250	3.00 (76.2)	3.10 (78.7)	2.23 (56.6)	3.62 (91.9)
T	30, 60	300	3.44 (87.4)	3.00 (76.2)	2.33 (59.2)	—
	30	600	3.75 (95.3)	3.31 (84.1)	2.26 (57.4)	—
	60	600	4.87 (123.7)	3.00 (76.2)	2.58 (65.5)	—

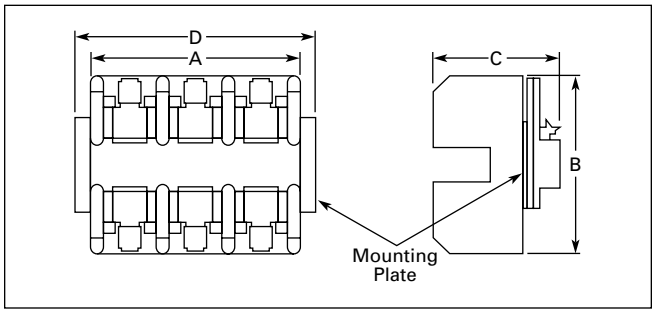


Figure 33-4. Approximate Dimensions in Inches (mm)

Mechanical Interlock and Reversing Kits

Mechanical interlocks and reversing kits are designed for field assembly of reversing contactors or starters from Freedom Series components. The Reversing Kits include a Mechanical Interlock, stabilizer bar and a pre-cut, trimmed and formed wire set. Auxiliary contacts, if required, must be ordered separately. See **Page 33-19**.

Cat. No. C321KM60B

Part No. 23-7165

Wire Set

Table 33-21. Mechanical Interlock Only ②③

Application			Catalog Number	Price U.S. $
NEMA Size	IEC Size	Contactor Mounting		
00 – 2	A – K	Horizontal	**C321KM60B**	15.70
3	L – N	Horizontal	**C321KM30**	50.50
3 to 4	N to P	Horizontal	**C321KM43**	55.00
4	P – S	Horizontal	**C321KM40**	50.50
4 to 5	—	Horizontal	**C321KM45**	50.50
4 to 6	S to T/U	Horizontal	**C321KM80**	67.50
5	—	Horizontal	**C321KM50**	50.50
5 to 6	—	Horizontal	**C321KM56**	67.50
6	T and U	Horizontal	**C321KM70**	67.50
6 to 7	T/U to V – X	Horizontal	**C321KM90**	67.50
7	V, W and X	Horizontal	**C321KM34**	260.00
4 or 5 to 5	P – S to 5	Vertical	**C321KM55**	50.50
5 to 6	—	Vertical	**C321KM65**	55.00
6	T and U	Vertical	**C321KM66**	65.00
6 to 7	T/U to V – X	Vertical	**C321KM67**	260.00

② Without cross-wiring.
③ For use with latest series product.

Table 33-22. Reversing Kits (Horizontal Contactor Mounting Only)

Application		Catalog Number	Price U.S. $
NEMA Size	IEC Size		
00	A – C	**C321KM60K14B**	33.50
0	D – F	**C321KM60K13B**	33.50
1	—	**C321KM60K15B**	50.50
2	G – K	**C321KM60K16B**	50.50
3	—	**C321KM60K17** ④	67.50
—	L and M	**C321KM60K21** ④	67.50
—	N	**C321KM60K18** ④	67.50
4	—	**C321KM60K19** ④	67.50
5	—	**C321KM60K20** ④	67.50
—	P – S	**C321KM60K44** ④	67.50

④ Kit includes (2) NC auxiliary contacts.

Discount Symbol **1CD1C**

Solid-State Timers

Solid-State Timer

Solid-State ON DELAY Timer — Side Mounted on Freedom Series NEMA 00 – 2, IEC A – K and C25D, C25E and C25F Frame

This timer is designed to be **wired in series with the load** (typically a coil). When the START button is pushed (power applied to timer), the ON DELAY timing function starts. At the completion of the set timing period, timer and series wired load will both be energized.

Table 33-23. Mounted Timer Product Selection

Timing Range	Catalog Number ①②③	Price U.S. $
.1 – 1.0 Seconds	**C320TDN1_**	84.00
1 – 30 Seconds	**C320TDN30_**	84.00
30 – 300 Seconds	**C320TDN300_**	84.00
5 – 30 Minutes	**C320TDN3000_**	84.00

① Add operating voltage Suffix to Catalog Number. **A** = 120V, **B** = 240V, **E** = 208V

② Rated .5 ampere pilot duty — not to be used on larger contactors.

③ Terminal connections are quick connects only. Two per side.

Shorting Bar Kits

These kits provide phase-to-phase power connections of contactors for field assembly. The kits include bus connections and mounting hardware. The shorting bars connect all three phases of a single contactor.

Table 33-24. Product Selection

Description	Catalog Number	Price U.S. $
NEMA Size 3, IEC Sizes L – N	**C321SB18**	16.80
NEMA Size 4, IEC Sizes A – S	**C321SB19**	20.10
NEMA Size 5	**C321SB21**	21.30
NEMA Size 6, IEC Sizes T and U	**C321SB22**	22.40

Pneumatic Timers — Top Mounted

Attachment mounts on top of any NEMA Size 00 – 2 or IEC Size A – K Freedom Series starter or contactor (top mounted auxiliary contacts can not be installed on device when timer is used). Timer unit has 1NO-1NC isolated timed contacts — circuits in each pole must be the same polarity. Units are convertible from OFF to ON DELAY or vice-versa.

Table 33-25. Product Selection

Timing Range	Catalog Number	Price U.S. $
.1 to 30 Seconds	**C320TP1**	162.00
10 to 180 Seconds	**C320TP2**	162.00

Table 33-26. Maximum Ampere Ratings

Description	Volts AC			
	120	240	480	600
Make	30	15	7.5	6
Break	3	1.5	.75	.6

Locking Cover for Overload Relay — C306 Only

Snap-on transparent or opaque plastic panel for covering access port to the overload relay trip setting dial — helps prevent accidental or unauthorized changes to trip and reset setting.

Table 33-27. Product Selection

Description	Min. Ordering Quantity (Std. Pkg.)	Catalog Number	Price U.S. $
Clear cover, no accessibility	50	**C320PC3**	.86
Gray cover, no accessibility, with Auto only nib	50	**C320PC4**	.86
Gray cover, no accessibility, with Manual only nib	50	**C320PC5**	.86
Gray cover with FLA dial accessibility, A, B, C, D positions and Auto only nib	50	**C320PC6**	.86
Gray cover with FLA dial accessibility, A, B, C, D positions and Manual only nib	50	**C320PC7**	.86

Identification Markers

IEC Sizes A – K, NEMA Sizes 00 – 2

Designed to snap on the face of contactor for easy, personalized identification of individual devices. Includes holder and labels.

Table 33-28. Product Selection

Description	Catalog Number	Price U.S. $
Identification Marker	**C320DL2**	12.00

Control Circuit Fuse Block

These panel mounted fuse holders, designed for control circuit protection or other similar low current requirements, have extractor type fuse caps. The Class CC rejection type fuses (KTK-R) used in these holders are intended for use with equipment designated as being suitable for use on systems having high available fault currents. If branch circuit protective device is 45A or greater, C320FBR fuse kit may be required for control circuit protection per NEC 430-72.

Table 33-29. Product Selection

Type	Max. Amperes	Catalog Number	Price U.S. $
Fuse Holder Only	15	**C320FB** ①	16.80
	30	**C320FBR** ②	33.50

① A fuse is not supplied, but holder will accept a Bussman Type KTK or KTK-R (13/32" x 1-1/2") fuse, 600V maximum.

② Includes a 5A, 600V KTK-R fuse.

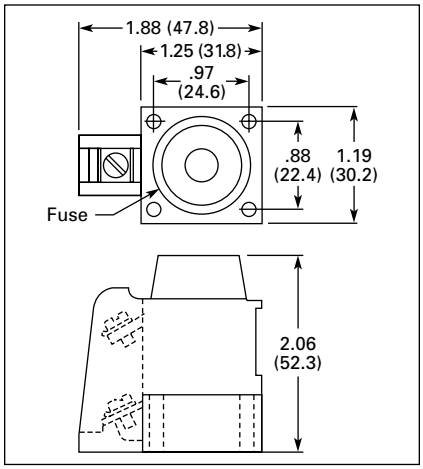
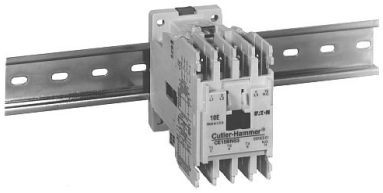


Figure 33-5. Approximate Dimensions in Inches (mm)

Discount Symbol **1CD1C**

DIN Rail Mounting Channel — 35 mm

Designed for DIN rail mounting of IEC style contactors and starters.



DIN Rail

Table 33-30. Product Selection

Description	Catalog Number	Price U.S. $
1 Meter Length	**MC382MA1**	8.05

Finger Protection Shields

Snap-on shields for both contactors and starters provide IEC Type IP20 Finger Protection. Prevents accidental contact with line/load terminals.

Table 33-31. Product Selection

Application	Catalog Number	Price U.S. $
NEMA Size 00, IEC Sizes A – C	**C320LS1**	3.45
NEMA Size 0, IEC Sizes D – F	**C320LS2**	3.45
NEMA Sizes 1 – 2, IEC Sizes G – K		
Contactors	**C320LS3**	4.55
Reversing Contactors	**C320LS4**	6.75
NEMA Size 1		
Starters	**C320LS5**	4.55
Reversing Starters	**C320LS6**	6.75
NEMA Size 2, IEC Sizes G – K		
Starters	**C320LS7**	4.55
Reversing Starters	**C320LS8**	6.75

Adapter to DIN Rail Mount

NEMA 1 – 2 and IEC G – K Contactors

Designed to allow DIN rail mounting of NEMA 1 – 2 and IEC G – K contactors. Includes all hardware required to convert contactors from panel mounting to 35 mm DIN rail mounting.

Table 33-32. Product Selection

Catalog Number	Price U.S. $
C320DN65	18.80

Transient Suppressor Kits

NEMA Sizes 00 – 2, IEC Sizes A – K

Cat. No. C320TS2

These kits limit high voltage transients produced in the control circuit when power is removed from the contactor or starter coil. There are three separate suppressors for use on 24 – 120V, 208 – 240V or 277 – 480V coils respectively.

These devices mount directly to the coil terminals of Freedom Series contactors or starters NEMA Sizes 00 – 2, IEC Sizes A – K and lighting contactors 10 – 60A. Reversing devices will require two.

Table 33-33. Product Selection

Description	Coil ① Voltage	Catalog Number	Price U.S. $
Transient Suppressor	24/120V	**C320TS1**	40.25
	208/240V	**C320TS2**	40.25
	277/480V	**C320TS3**	40.25

① Suppressor is compatible with coil voltages/ranges as shown, both 50 and 60 Hz.

NEMA Sizes 3 – 5, IEC Sizes L – S

This device mounts on top of any side mounted auxiliary contact on Freedom Series NEMA Sizes 3 – 5, IEC Sizes L – S and lighting contactors 100 – 300A. It connects across coil terminals on any 120V contactor or starter magnet coil (reversing starters or contactors require 2).

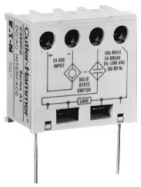
Limits high voltage transients produced in the circuit when power is removed from the coil.

Table 33-34. Product Selection

Description	Coil Voltage	Catalog Number	Price U.S. $
Transient Suppressor	120V	**C320AS1**	46.50

Discount Symbol **1CD1C**

DC/AC Interface Module



Cat. No. C320DC

The Catalog Number C320DC Interface Module is an optically isolated solid-state switch which provides a means of operating AC coils with 5 – 48V DC control signal. It acts as a space saving interposing relay which can switch a specified 50/60 Hz AC source to the contactor or starter coil.

The module may be directly attached to the coil terminals of any Freedom Series contactor or starter — NEMA Sizes 00 – 3, IEC Sizes A – N and lighting contactors 10 – 100A. It also has provisions for DIN rail mounting.

The module will operate coils within the voltage ranges shown in **Table 33-35**.

Design Characteristics

- DC Input: 5 – 48V DC at mA nominal
- AC Operating Voltage: 240V AC (360 VA) ±10% 50/60 Hz;
- DC Operating Voltage: 30V DC max. (.5A)
- AC Current Rating
  - 10A make (inrush)
  - 1A break (sealed)

Table 33-35. Controller Coil Voltage Ranges

Controller Catalog Number Prefix	Controller Size or Rating	Coil Range Volts AC
AE16, AE17, AE56, AE57, CE15, CE55	A – F G – K L – N	24 – 240 48 – 240 110 – 240
AN16, AN56, CN15, CN55	00 – 0 1 – 2 3	24 _ 240 48 – 240 110 – 240
CN35	10 – 30A 60A 100A	24 – 240 48 – 240 110 – 240

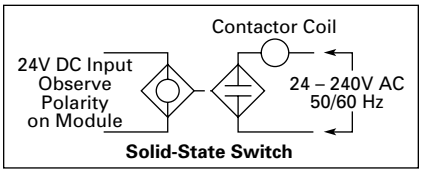


Figure 33-6. Typical Application

Table 33-36. Product Selection

Catalog Number	Coil Voltage	Price U.S. $
C320DC2V5	5V DC	87.00
C320DC2V6	6V DC	87.00
C320DC2V9	9V DC	87.00
C320DC2V12	12V DC	87.00
C320DC2V24	24V DC	87.00
C320DC2V48	48V DC	87.00

Adhesive Dust Cover

NEMA Sizes 00 – 2, IEC Sizes A – K

These adhesive stickers come 25 to a package and provide extra protection from contaminants when applied to the sides of Freedom NEMA Sizes 00 – 2 and IEC Sizes A – K. Adhesive covers are easily applied to side opening where auxiliaries are not installed and provide extra protection from metal filings and other debris.

Table 33-37. Product Selection

Catalog Number	Price U.S. $
C320DSTCVR (25 to a package)	8.10

Add-On Power Pole Kit

NEMA Sizes 00 – 2, IEC A – K

This device mounts on the side of Freedom NEMA Size 00 – 2 and IEC Size A – K contactors. One unit can be mounted on each side and carries UL, cUL and IEC ratings. The device is rated for resistive, inductive and lighting applications.

Table 33-38. Product Selection

UL Ampere Rating						IEC 947 Ampere Rating				
Inductive 600V	Resistive 600V	Horsepower 1-Phase		Locked Rotor 240V	Lighting Ballast Tungsten 480V	AC-1 600V	AC-3 600V	AC-5a AC-5b 480V	1NO Power Pole Catalog Number	Price U.S. $
		115V	230V							
15	20	1/2	2	96	20	20	12	18	**C320PPD10**	28.00

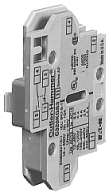
Discount Symbol **1CD1C**

Auxiliary Contacts

NEMA Sizes 00 – 2 — IEC Sizes A – K

The auxiliary contacts listed below are designed for installation on Freedom Series starters and contactors. Snap-on design facilitates quick, easy installation.

These bifurcated design contact blocks, featuring silver cadmium alloy contacts, are well suited for use in very low energy (logic level) circuits.



Side Mounted

Top Mounted

Table 33-39. Product Selection

Description	Catalog Number	Contact Configuration Code ①	Price U.S. $
Side Mounted			
1NO	**C320KGS1**	10	20.10
1NC	**C320KGS2**	01	20.10
1NO-1NC	**C320KGS3**	11	27.00
2NO	**C320KGS4**	20	27.00
2NC	**C320KGS5**	02	27.00
1NO-1NCI	**C320KGS6**	N/A	27.00
1NO (EC)-1NC (LO)	**C320KGS7**	N/A	27.00
1NCI	**C320KGS8**	N/A	27.00
Top Mounted			
1NO	**C320KGT1**	10	20.10
1NC	**C320KGT2**	01	20.10
1NO-1NC	**C320KGT3**	11	27.00
2NO	**C320KGT4**	20	27.00
2NC	**C320KGT5**	02	27.00
1NO-1NCI	**C320KGT6**	N/A	27.00
1NO (EC)-1NC (LO)	**C320KGT7**	N/A	27.00
1NCI	**C320KGT8**	N/A	27.00
3NO	**C320KGT9**	30	54.50
2NO-1NC	**C320KGT10**	21	54.50
1NO-2NC	**C320KGT11**	12	54.50
3NC	**C320KGT12**	03	54.50
4NO	**C320KGT13**	40	54.50
3NO-1NC	**C320KGT14**	31	54.50
2NO-2NC	**C320KGT15**	22	54.50
1NO-3NC	**C320KGT16**	13	54.50
4NC	**C320KGT17**	04	54.50
3NO-1NCI	**C320KGT18**	N/A	54.50
2NO-1NCI-1NC	**C320KGT19**	N/A	54.50
2NO-1NO (EC)-1NC (LO)	**C320KGT20**	N/A	54.50
1NO-1NC-1NO (EC)-1NC (LO)	**C320KGT21**	N/A	54.50

Note: NCI = Normally Closed early opening designed for use in reversing applications. EC = Early Closing. LO = Late Opening.

① For reference only — not part of Catalog Number. See below.

Contact Configuration Code

This two-digit code is found on the auxiliary contact to assist in identifying the specific contact configuration. The first digit indicates the quantity of NO contacts and the second indicates the quantity of NC contacts.

NEMA Sizes 3 – 8 — IEC Sizes L – Z

Table 33-40. Product Selection

Circuit	Catalog Number		Contact Configuration Code ②	Price U.S. $
Base Auxiliary Contacts — NEMA Sizes 3 – 5, IEC Sizes L – S				
	NEMA Size 3 IEC Sizes L – N	NEMA Sizes 4 – 5 IEC Sizes P – S		
NO	**C320KGS31**	**C320KGS41**	10	40.25
NO-NC	**C320KGS32**	**C320KGS42**	11	54.50
Auxiliary Contacts — NEMA Sizes 3 – 5, IEC Sizes L – S				
	Catalog Number			
NO	**C320KGS20**		10	40.25
NC	**C320KGS21**		01	40.25
NO-NC ③	**C320KGS22**		11	54.50
Auxiliary Contacts — NEMA Sizes 6 – 8, IEC Sizes T – Z				
	Size	Catalog Number		
NO-NC	NEMA 8, IEC Z	**C320KA5**	11	149.00
2NO-2NC	NEMA 6 – 7	**C320KA6**	22	149.00
2NO-2NC	IEC T – X	**C320KA8**	22	149.00

② For reference only — not part of Catalog Number. See below left.

③ NO-NC occupies two positions — L2 and L3, or R2 and R3. See **Figure 33-7** on **Page 33-20**.

Base Auxiliary Contact Cat. No. C320KGS42

Auxiliary Contact Cat. No. C320KGS22

Auxiliary Contact Ratings (Amperes)

Table 33-41. Ratings — NEMA A600

Current	AC Volts			
	120V	240V	480V	600V
Make and Interrupting	60	30	15	12
Break	6	3	1.5	1
Continuous	10	10	10	10

Table 33-42. Ratings — NEMA P300

Continuous Thermal Rating: 5A	
DC Volts	**Make/Break Amperes**
125	1.10
250	.55

Table 33-43. Ratings — Logic Level

Minimum Ratings for Logic Level and Hostile Atmosphere Application	
Minimum Amperes	20 mA
Minimum Volts	24V AC/DC

Discount Symbol **1CD1C**

Auxiliary Contact Location

NEMA Sizes 00 – 2, IEC Sizes A – K

The sketches below illustrate the maximum number of auxiliary contacts that can be assembled to a contactor or starter and their locations.

33

Table 33-44. Auxiliary Contacts

Catalog Number	Size	Poles	Available Mounting Positions ①②	
			Open Type	Enclosed
AE16	A – K	3	T1, L1	L1
AN16	00 0 – 2	3 3	T1, L1, R1 T1, L1	L1 L1
AE56	A – K	3	L1, R1	L1, R1
AN56	00 – 2	3	T1, T2	—
CE15	A – C D – K G – J G – J	2 – 4 3 4 5	T1, L1, R1 T1, L1 T1, R1 T1	L1, R1 L1 — —
CN15	00 0 – 2 1, 2 1, 2	2 – 4 2 – 3 4 5	T1, L1, R1 T1, L1 T1, L1 T1, L1	L1 L1 — —
CN35	10A 20 – 60A 60A 60A	2 – 4 2 – 3 4 5	T1, L1, R1 T1, L1 T1, L1 T1, L1	L1 L1 — —
CE55	A – K	3	L1, R1	L1, R1
CN55	00 – 2	3	T1, T2	—

① Available positions on contactors or starters other than what is factory installed.

② When a pneumatic timer is mounted on contactor, only side mounted auxiliary contact positions are available. The solid-state timer, when added, takes up side mounted auxiliary contact position.

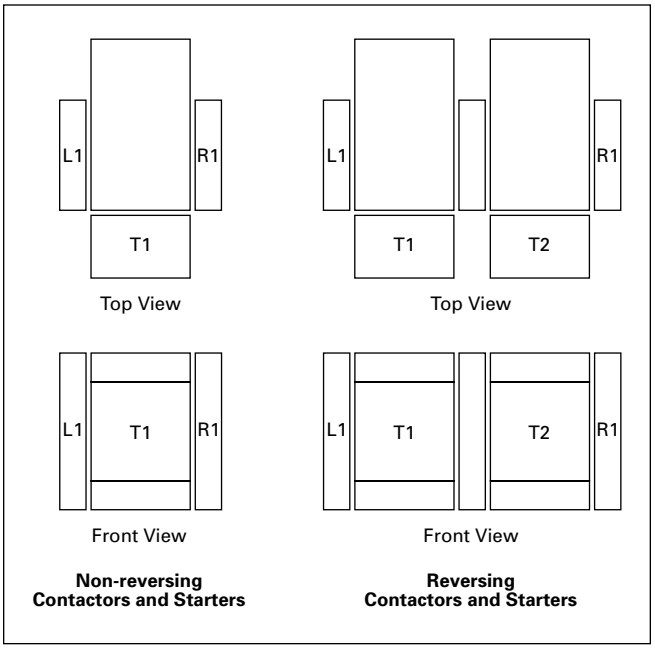


Figure 33-7. Auxiliary Contact Location

NEMA Sizes 3 – 8, IEC Sizes L – Z

The sketches below illustrate the maximum number of auxiliary contacts that can be assembled to a contactor and their locations.

Note: A Base Auxiliary Contact must be added in position R1 before additional auxiliary contacts can be mounted on NEMA Size 3 and IEC Sizes L – N, or in L1 on NEMA Sizes 4 – 5 and IEC Sizes P – S.

Table 33-45. Mounting Positions

Size	Available Mounting Positions ③
NEMA Size 3, IEC Sizes L – N	R2, R3, L1, L2, L3
NEMA Sizes 4 – 5, IEC Sizes P – S	L2, L3, R1, R2, R3
NEMA Sizes 6 – 7, IEC Sizes T – X	R1
NEMA Size 8, IEC Size Z	L2, R2

③ Available positions on contactors or starters other than what is factory installed.

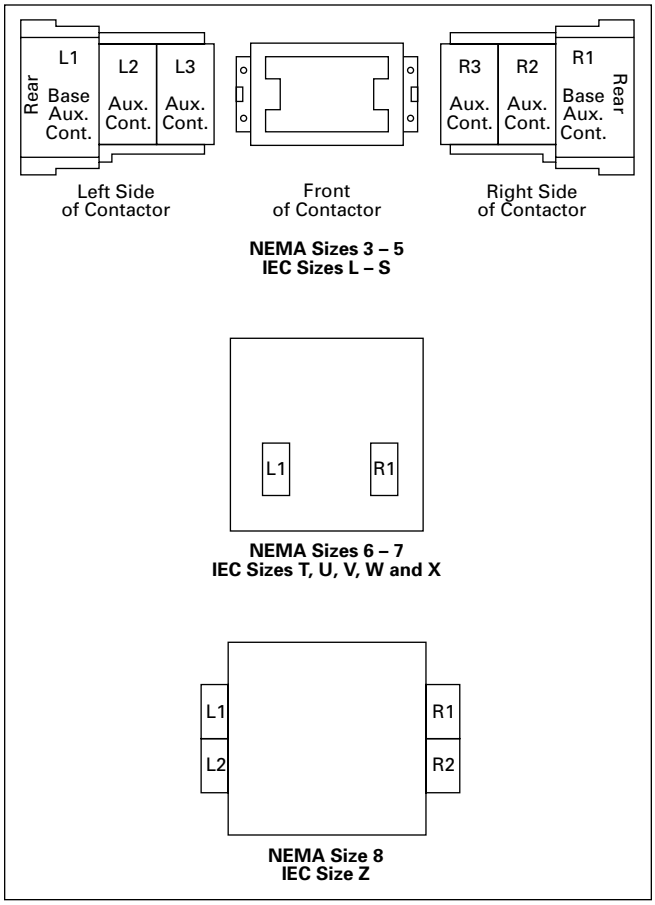


Figure 33-8. Auxiliary Contact Location

DC Magnet Coils

When Ordering Specify

Conversion Kit for Field Assembly

- Catalog Number

Factory Installed DC Coil

- For factory installed DC magnet coil on AC contactors or non-combination starters (open type only), substitute the Code Suffix from table below for the magnet coil identifier in the device Catalog Number.

EXAMPLE: For Size 0 AC contactor with a 24V DC coil, change AN16BN0**A**C to AN16BN0**T1**C.

Application

- Connect for separate control
- Not for use with cover control switch operators
- Use twin break, heavy-duty pilot devices.
- Designed for +10%, -20% rated voltage, continuous duty operation.

Non-reversing Kit Consists of:

- 1 Encapsulated DC magnet coil
- 1 NCI or NO/NCI side mounted auxiliary contact

  Note: These kits are supplied with a NO/NCI side mounted auxiliary contact in place of the NCI contact.
- 2 Blue colored connection wires
- 1 Instruction publication

Operation

See next page for operation details.

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Table 33-46. Product Selection

Contactor or Starter Size		Conversion Data					Complete Conversion Kit			Factory Installed	
		Volts	Magnet Coil			NCI Interlock					
NEMA	IEC		Coil Number	Amps P.U./Seal	Watts P.U./Seal		Catalog Number	Price U.S. $	Ship Wt. Lbs. (kg)	Code Suffix	Adder U.S. $
Non-reversing — Kit includes NCI Side Mounted Auxiliary contact											
00 and 0 CN35 – A, B, D D15 Relays	A – F	12 24 48 120	**9-2988-11** **9-2988-12** **9-2988-13** **9-2988-14**	6.4/.28 3.2/.14 1.6/.07 .64/.028	76.8/3.36 76.8/3.36 76.8/3.36 76.8/3.36	**C320KGD1** **C320KGD1** **C320KGD1** **C320KGD1**	**C335KD3R1** **C335KD3T1** **C335KD3W1** **C335KD3A1**	30.50 30.50 30.50 30.50	1.0 (.5)	**R1** **T1** **W1** **A1**	34.00 34.00 34.00 34.00
① 00 and 0 CN35 – A, B, D D15 Relays	A – F	12 24 48 120	**9-2988-11** **9-2988-12** **9-2988-13** **9-2988-14**	6.4/.28 3.2/.14 1.6/.07 .64/.028	76.8/3.36 76.8/3.36 76.8/3.36 76.8/3.36	**C320KGD2** ① **C320KGD2** ① **C320KGD2** ① **C320KGD2** ①	**C335KD3R4** **C335KD3T4** **C335KD3W4** **C335KD3A4**	50.50 50.50 50.50 50.50	1.0 (.5)	**R4** **T4** **W4** **A4**	54.00 54.00 54.00 54.00
1 and 2 CN35 – G	G – K	12 24 48 120	**9-2990-1** **9-2990-2** **9-2990-3** **9-2990-4**	15.4/.42 7.7/.21 3.9/.11 1.5/.041	185/4.98 185/4.96 185/5.04 185/4.87	**C320KGD5** **C320KGD5** **C320KGD5** **C320KGD5**	**C335KD4R4** **C335KD4T4** **C335KD4W4** **C335KD4A4**	50.50 50.50 50.50 50.50	1.0 (.5)	**R4** **T4** **W4** **A4**	58.00 58.00 58.00 58.00
3 CN35 – K	L – N	12 24 48 120	**9-3002-1** **9-3002-2** **9-3002-3** **9-3002-4**	24/.40 12/.20 6.1/.097 2.5/.038	293/4.84 288/4.75 295/4.67 298/4.57	**C320KGD3** **C320KGD3** **C320KGD3** **C320KGD3**	**C335KD5R1** **C335KD5T1** **C335KD5W1** **C335KD5A1**	75.50 75.50 75.50 75.50	2.0 (.9)	**R1** **T1** **W1** **A1**	92.00 92.00 92.00 92.00
4 and 5 CN35 – N, S	P – S	24 48 120 240	**9-2026-4** **9-2026-3** **9-2026-2** **9-2026-1**	18/.22 9/.11 3.3/.05 1.7/.02	400/5.3 400/5.2 450/5.4 440/4.9	**C320KGD3** **C320KGD3** **C320KGD3** **C320KGD3**	**C335KA3T1** **C335KA3W1** **C335KA3A1** **C335KA3B1**	258.00 258.00 258.00 258.00	2.5 (1.1)	**T1B** **W1B** **A1B** **B1B**	325.00 325.00 325.00 325.00
Reversing											
00 and 0 CN35 – A, B, D D15 Relays	A – F	12 24 48 120	**(2) 9-2988-1** **(2) 9-2988-2** **(2) 9-2988-3** **(2) 9-2988-4**	6.4/.28 3.2/.14 1.6/.07 .64/.028	76.8/3.36 76.8/3.36 76.8/3.36 76.8/3.36	**(2) C320KGD1** **(2) C320KGD1** **(2) C320KGD1** **(2) C320KGD1**	**C335RD3R1** ② **C335RD3T1** ② **C335RD3W1** ② **C335RD3A1** ②	115.00 115.00 115.00 115.00	1.0 (.5)	**R1** ③ **T1** ③ **W1** ③ **A1** ③	125.00 125.00 125.00 125.00
1 and 2 CN35 – G	G – K	12 24 48 120	**(2) 9-2990-1** **(2) 9-2990-2** **(2) 9-2990-3** **(2) 9-2990-4**	15.4/.42 7.7/.21 3.9/.11 1.5/.041	185/4.98 185/4.96 185/5.04 185/4.87	**(2) C320KGD3** **(2) C320KGD3** **(2) C320KGD3** **(2) C320KGD3**	④			**R1** ③ **T1** ③ **W1** ③ **A1** ③	220.00 220.00 220.00 220.00

① These kits are supplied with a NO/NCI side mounted auxiliary contact in place of the NCI contact.
② Kit does not include mechanical interlock or crossover wiring. Two NO/NCI top mounted auxiliary contacts are supplied for electrical interlocking.
③ Factory installed DC coils on NEMA contactors and starters include a NO/NC top mounted auxiliary contact on each contactor for electrical interlocking. On IEC contactors and starters, a NC top mounted auxiliary contact is supplied on each contactor for electrical interlocking.
④ Available factory assembled only.

Discount Symbol **1CD1C**

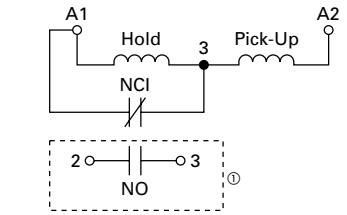
Operation

These DC coil kits have separate pick-up and seal windings. A **special** (side mounted) early-break NCI auxiliary contact is used to either disconnect the pick-up winding or insert the seal winding in series with the pick-up winding, depending on the frame size of the contactor. DC coil kits come in two styles, a suffix **1** and a suffix **4**. The 1 suffix contains only the **special** (side mounted) early break NCI auxiliary contact. The 4 suffix contains a NO contact in the same package as the **special** (side mounted) early-break NCI auxiliary contact.

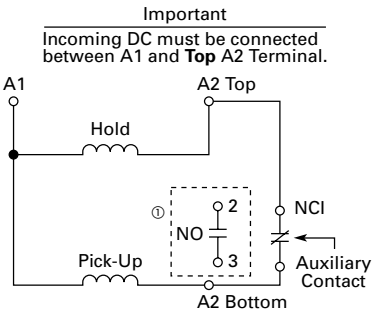
Note: For NEMA Sizes 00 and 0 and IEC Sizes A – F, contactors may utilize either suffix 1 or 4 DC coil kits; starters may utilize suffix 4 DC coil kits only. For NEMA Sizes 1 and 2 and IEC Sizes G – K, both contactors and starters may utilize a suffix 4 DC coil kit only.

On the above sizes only, when the **special** auxiliary package is mounted on the side of a contactor or starter, **no** standard auxiliary contact may be mounted on the same side.

Note: For NEMA Sizes 3 – 5 and IEC Sizes L – S, special coil NCI clearing contact is an add-on auxiliary (**must** mount on a base mount auxiliary contact; normally a 1NO). This arrangement will normally account for two of the three contact positions on the side of each contactor or starter.



DC Coil Elementary Diagram for NEMA Sizes 1 – 3 and IEC Sizes G – N Contactors and Starters



DC Coil Elementary Diagram for NEMA Sizes 00, 0, 4 & 5 and IEC Sizes A – F & P – S Contactors and Starters

Figure 33-9. Elementary Diagrams

① 1NO available in Suffix 4 kits only.

Metal Mounting Plates

Metal Mounting Plates

Table 33-47. Metal Mounting Plates — For Use on IEC Style Contactors, Starters and Overload Relays

Application	Catalog Number	Price U.S. $
Contactors		
IEC Sizes A – F	**C321MP1**	10.10
IEC Sizes G – K	**C321MP2**	16.80
Non-reversing Starters		
IEC Sizes A – F	**C321MP3**	16.80
IEC Sizes G – K	**C321MP4**	27.00
Overload Relays ②		
32A	**C321MP5**	10.10
75A	**C321MP6**	16.80
Reversing Starters		
IEC Sizes A – F	**C321MP7**	27.00
IEC Sizes G – K	**C321MP12**	40.25
IEC Sizes L – N	**C321MP11**	62.00
Reversing Contactors		
IEC Sizes A – F	**C321MP8**	20.10
IEC Sizes G – K	**C321MP9**	27.00
IEC Sizes L – N	**C321MP13**	33.50

② For use with DIN rail and base mounting adapters listed on **Page 33-34**.

Competitive Mounting Plates

C321CMP1

The C321 adapter plates permit direct replacement of competitive starters with Freedom Series starters without drilling and tapping new mounting holes.

Table 33-48. Product Selection

Description	Index Number ③	
	Catalog Number	Price U.S. $
Freedom Sizes 00 and 0	**C321CMP0**	10.10
Freedom Size 1	**C321CMP1**	10.10
Freedom Size 2	**C321CMP2**	10.10
Freedom Size 3	**C321CMP3**	16.80
Freedom Size 4	**C321CMP4**	22.40
Freedom Size 5	**C321CMP5**	28.00

③ Handling Number Only — Does not appear on product. The handling number is stamped on the carton label only.

Table 33-49. Competitive Starter Replacement

Starter to Be Replaced	NEMA Size	Adapter Kit	
		Catalog Number	Price U.S. $
Allen-Bradley 509, Cutler-Hammer A10 ④, Furnas 14, ESP100, General Electric CR206, CR306, Siemens SXL, Square D 8536, Westinghouse A200, B200	0	**C321CMP0**	10.10
	1	**C321CMP1**	10.10
	2	**C321CMP2**	10.10
	3	**C321CMP3**	16.80
	4	**C321CMP4**	22.40
	5	**C321CMP5**	28.00

④ Adapter not required for replacing Sizes 1, 4 and 5 A10 starters.

Table 33-50. Metal Mounting Plates — Approximate Dimensions and Shipping Weights

Catalog Number	Dimensions in Inches (mm)			Ship Wt. Lbs. (kg)
	Wide	High	Mounting	
C321MP1	2.00 (50.8)	3.88 (98.6)	1.50 x 3.38 (38.1 x 85.9)	.2 (.1)
C321MP2	2.56 (65.0)	5.05 (128.3)	2.00 x 4.50 (50.8 x 114.3)	.4 (.2)
C321MP3	1.80 (45.7)	6.60 (167.6)	6.07 (154.2) ⑤	.7 (.3)
C321MP4	2.56 (65.0)	8.08 (205.2)	2.00 x 7.63 (50.8 x 193.8)	.6 (.3)
C321MP5	1.77 (45.0)	4.63 (117.6)	4.27 (108.5) ⑤	.3 (.1)
C321MP6	2.52 (64.0)	5.14 (130.6)	2.00 x 4.59 (50.8 x 116.6)	.4 (.2)
C321MP7	4.20 (106.7)	7.38 (187.5)	3.50 x 6.87 (88.9 x 174.5)	.8 (.4)
C321MP8	4.20 (106.7)	4.35 (110.5)	3.50 x 3.86 (88.9 x 98.0)	.5 (.2)
C321MP9	5.66 (143.8)	5.05 (128.3)	5.25 x 3.63 (133.4 x 92.2)	.8 (.4)
C321MP11	8.70 (221.0)	11.35 (288.3)	7.00 x 10.81 (177.8 x 274.6) ⑥	1.2 (.5)
C321MP12	5.71 (145.0)	8.08 (205.2)	5.25 x 6.75 (133.4 x 171.5) ⑥	.9 (.4)
C321MP13	8.70 (221.0)	7.17 (182.1)	7.00 x 6.63 (177.8 x 168.4) ⑥	.9 (.4)

⑤ 2-hole mounting.

⑥ 3-hole mounting.

Discount Symbol **1CD1C**

Table 33-51. Competitive Mounting Plates — Approximate Dimensions and Shipping Weights

NEMA Size	Catalog Number	Dimensions in Inches (mm)		Ship Wt. Lbs. (kg)
		Wide A	Deep B	
0 – 00	**C321CMP0**	3.25 (82.6)	8.50 (215.9)	.63 (.29)
1	**C321CMP1**	3.75 (95.3)	9.50 (241.3)	.90 (.41)
2	**C321CMP2**	3.75 (95.3)	10.25 (260.4)	1.20 (.54)
3	**C321CMP3**	6.00 (152.4)	12.75 (323.9)	2.40 (1.09)
4	**C321CMP4**	7.50 (190.5)	13.50 (342.9)	3.00 (1.36)
5	**C321CMP5**	11.00 (279.4)	19.00 (482.6)	6.63 (3.01)

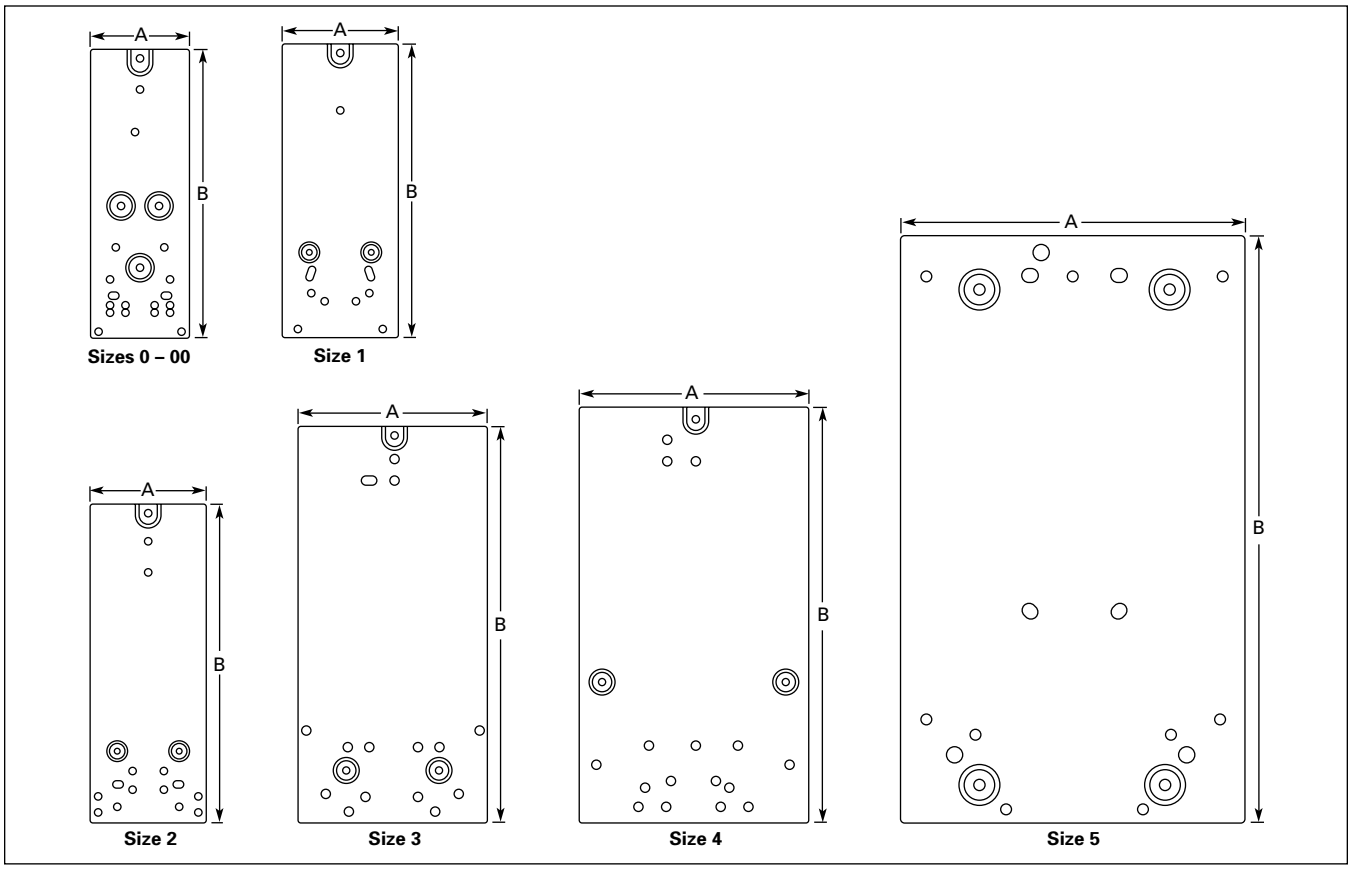


Figure 33-10. Approximate Dimensions

Special Modifications

Table 33-52. For Catalog Numbers AE16, AE17, AN16, AE56, AE57, AN56, CE15, CN15, CN35, CE55, CN55

Addition or Special Feature	Starter Size and Price Adder (U.S. $) — NEMA/IEC									
	00/ A – C	0/ D – F	1 —	2/ G – K	3/ L – N	4/ P – S	5/ T – U	6/ V	7/ W – X	8/ Z
Control Circuit										
Extra Auxiliary Circuit, Factory Installed NO or NC — each contact ①	②									
Transient Suppressor ①	②									
Power Circuit										
Contactor/Starter for Ring Lug Capability — Add Mod Code **T16** to Catalog Number (Power Terminals Only, Control Terminals as Standard) Standalone Overload Relays Can Not Accept Ring Lugs on Line Side	②									
Factory Installed Dust Covers										
Factory Installed C320DSTCVR — Add Mod Code **-53** to Catalog Number ①	②		NA	NA	NA	NA	NA	NA		

① These modifications are generally available in Kit form at lower cost. See specific product sections for Kit listings.
② Consult factory for prices.

Note: For a complete listing of parts, refer to the Renewal Parts Publication Number referenced below.

Table 33-53. For Catalog Numbers AN16, AN30, AN40, AN56, AN70, AN80, AN800, CN15, CN35 ② and CN55 Contactors and Starters

Description		NEMA Size 00-0	Price U.S. $	NEMA Size 00		Price U.S. $	NEMA Size 0		Price U.S. $
		Series A1		Series B1	Series C1		Series B1	Series C1	
		Part No.		Part No.	Part No.		Part No.	Part No.	
Renewal Parts Publication Number		None		None	None		None	None	
Contact Kits									
2-Pole		①		①	①		①	①	
3-Pole		①		①	①		①	①	
4-Pole		①		①	①		①	①	
5-Pole		①		①	①		①	①	
Magnet Coils	**Coil Suffix**								
120V 60 Hz or 110V 50 Hz	A	9-2650-1	61.00	9-2875-1	9-2875-1	61.00	9-2876-1	9-2876-1	61.00
240V 60 Hz or 220V 50 Hz	B	9-2650-2	61.00	9-2875-2	9-2875-2	61.00	9-2876-2	9-2876-2	61.00
480V 60 Hz or 440V 50 Hz	C	9-2650-3	61.00	9-2875-3	9-2875-3	61.00	9-2876-3	9-2876-3	61.00
600V 60 Hz or 550V 50 Hz	D	9-2650-4	61.00	9-2875-4	9-2875-4	61.00	9-2876-4	9-2876-4	61.00
208V 60 Hz	E	9-2650-5	61.00	9-2875-5	9-2875-5	61.00	9-2826-5	9-2826-5	61.00
277V 60 Hz	H	9-2650-13	61.00	9-2875-12	9-2875-12	61.00	9-2826-12	9-2826-12	61.00
208/240V 60Hz	J	—	—	9-2875-37	9-2875-37	61.00	9-2826-17	9-2826-17	61.00
240V 50Hz	K	9-2650-12	61.00	9-2875-11	9-2875-11	61.00	9-2826-11	9-2826-11	61.00
380 – 415V 50 Hz	L	9-2650-6	61.00	9-2875-6	9-2875-6	61.00	9-2826-6	9-2826-6	61.00
380V 50 Hz	L	—	—	—	—	—	—	—	—
415V 50 Hz	M	—	—	—	—	—	—	—	—
550V 50 Hz	N	—	—	—	—	—	—	—	—
24V 60 Hz – 24V 50 Hz	T	—	—	9-2875-36	9-2875-36	61.00	9-2876-36	9-2876-36	61.00
24V 60 Hz	T	9-2650-7	61.00	—	—	—	—	—	—
24V 50 Hz	U	9-2650-14	61.00	9-2875-36	9-2875-36	61.00	9-2876-36	9-2876-36	61.00
32V 50 Hz	V	9-2650-9	61.00	9-2875-16	9-2875-16	61.00	9-2876-16	9-2876-16	61.00
48V 60 Hz	W	9-2650-8	61.00	9-2875-8	9-2875-8	61.00	9-2876-8	9-2876-8	61.00
48V 50 Hz	Y	9-2650-10	61.00	9-2875-9	9-2875-9	61.00	9-2876-9	9-2876-9	61.00
Magnet Frame Armature									
Lower Magnet Frame		①		①	①		①	①	
Upper Magnet Frame		①		①	①		①	①	

Description		NEMA Size 1		Price U.S. $	NEMA Size 2		Price U.S. $	NEMA Size 3	Price U.S. $
		Series A1	Series B1		Series A1	Series B1			
		Part No.	Part No.		Part No.	Part No.		Part No.	
Renewal Parts Publication Number		20861	22177		20861	22177		20426	
Contact Kits									
2-Pole		6-65	6-65	64.00	6-65-7	6-65-7	122.00	6-43	199.00
3-Pole		6-65-2	6-65-2	102.00	6-65-8	6-65-8	182.00	6-43-2	299.00
4-Pole		6-65-9	6-65-9	135.00	6-65-15	6-65-15	242.00	—	—
5-Pole		6-65-10	6-65-10	170.00	6-65-16	6-65-16	303.00	—	—
Magnet Coils	**Coil Suffix**								
120V 60 Hz or 110V 50 Hz	A	9-2703-1	9-2703-1	72.50	9-2703-1	9-2703-1	72.50	9-2756-1	117.00
240V 60 Hz or 220V 50 Hz	B	9-2703-2	9-2703-2	72.50	9-2703-2	9-2703-2	72.50	9-2756-2	117.00
480V 60 Hz or 440V 50 Hz	C	9-2703-3	9-2703-3	72.50	9-2703-3	9-2703-3	72.50	9-2756-3	117.00
600V 60 Hz or 550V 50 Hz	D	9-2703-4	9-2703-4	72.50	9-2703-4	9-2703-4	72.50	9-2756-4	117.00
208V 60 Hz	E	9-2703-9	9-2703-9	72.50	9-2703-9	9-2703-9	72.50	9-2756-5	117.00
277V 60 Hz	H	9-2703-7	9-2703-7	72.50	9-2703-7	9-2703-7	72.50	9-2756-9	117.00
208/240V 60Hz	J	—	—	—	—	—	—	—	
240V 50Hz	K	9-2703-14	9-2703-14	72.50	9-2703-14	9-2703-14	72.50	9-2756-13	117.00
380 – 415V 50 Hz	L	9-2703-8	9-2703-8	72.50	9-2703-8	9-2703-8	72.50	—	
380V 50 Hz	L	—	—	—	—	—	—	9-2756-12	117.00
415V 50 Hz	M	—	—	—	—	—	—	9-2756-8	117.00
550V 50 Hz	N	—	—	—	—	—	—	9-2756-14	117.00
24V 60 Hz – 24V 50 Hz	T	—	—		—	—		—	
24V 60 Hz	T	9-2703-6	9-2703-6	72.50	9-2703-6	9-2703-6	72.50	9-2756-6	117.00
24V 50 Hz	U	9-2703-12	9-2703-12	72.50	9-2703-12	9-2703-12	72.50	9-2756-11	117.00
32V 50 Hz	V	9-2703-10	9-2703-10	72.50	9-2703-10	9-2703-10	72.50	9-2756-10	117.00
48V 60 Hz	W	9-2703-11	9-2703-11	72.50	9-2703-11	9-2703-11	72.50	9-2756-15	117.00
48V 50 Hz	Y	9-2703-13	9-2703-13	72.50	9-2703-13	9-2703-13	72.50	9-2756-7	117.00
Magnet Frame Armature									
Lower Magnet Frame		17-18200	17-18200	18.40	17-18200	17-18200	18.40	17-8955-2	43.75
Upper Magnet Frame		48-1936	48-1936	17.00	48-1936	48-1936	17.00	48-1902	18.10

① Replace with complete contactor.
② CN35A = Size 00, CN35B and CN35D = Size 0, CN35G = Size 2, CN35K = Size 3, CN35N = Size 4, and CN35S = Size 5.

Discount Symbol **1CD1C**

Note: For a complete listing of parts, refer to the Renewal Parts Publication Number referenced below.

Table 33-53. For Catalog Numbers AN16, AN30, AN40, AN56, AN70, AN80, AN800, CN15, CN35 ① and CN55 Contactors and Starters (Continued)

Description		NEMA Size 4		Price U.S. $	NEMA Size 5		Price U.S. $	NEMA Size 6		Price U.S. $
		Series A1	Series B1		Series A1	Series B1		Series A1	Series B1	
		Part No.	Part No.		Part No.	Part No.		Part No.	Part No.	
Renewal Parts Publication Number		**20428**	**20428**		**20429**	**20429**		**20146**	**20146**	
Contact Kits										
2-Pole		**6-44**	**6-26**	417.00	**6-45**	**6-45**	760.00	**6-601-2**	**6-601-2**	1,910.00
3-Pole		**6-44-2**	**6-26-2**	630.00	**6-45-2**	**6-45-2**	1,135.00	**6-601**	**6-601**	2,865.00
Magnet Coils	**Coil Suffix**									
120V 60 Hz or 110V 50 Hz	**A**	**9-1891-1**	**9-1891-1**	120.00	**9-1891-1**	**9-1891-1**	120.00	**9-2698**	**9-2698**	805.00
240V 60 Hz or 220V 50 Hz	**B**	**9-1891-2**	**9-1891-2**	120.00	**9-1891-2**	**9-1891-2**	120.00	**9-2698-2**	**9-2698-2**	805.00
480V 60 Hz or 440V 50 Hz	**C**	**9-1891-3**	**9-1891-3**	120.00	**9-1891-3**	**9-1891-3**	120.00	**9-2698-3**	**9-2698-3**	805.00
600V 60 Hz or 550V 50 Hz	**D**	**9-1891-4**	**9-1891-4**	120.00	**9-1891-4**	**9-1891-4**	120.00	**9-2698-4**	**9-2698-4**	805.00
208V 60 Hz	**E**	**9-1891-13**	**9-1891-13**	120.00	**9-1891-13**	**9-1891-13**	120.00	**9-2698-5**	**9-2698-5**	805.00
277V 60 Hz	**H**	**9-1891-26**	**9-1891-26**	120.00	**9-1891-26**	**9-1891-26**	120.00	—	—	—
208/240V 60Hz	**J**	—	—	—	—	—	—	—	—	—
240V 50Hz	**K**	**9-1891-20**	**9-1891-20**	120.00	**9-1891-20**	**9-1891-20**	120.00	—	—	—
380 – 415V 50 Hz	**L**	—	—	—	—	—	—	**9-2698-6**	**9-2698-6**	805.00
380V 50 Hz	**L**	**9-1891-14**	**9-1891-14**	120.00	**9-1891-14**	**9-1891-14**	120.00	—	—	—
415V 50 Hz	**M**	**9-1891-21**	**9-1891-21**	120.00	**9-1891-21**	**9-1891-21**	120.00	—	—	—
550V 50 Hz	**N**	**9-1891-8**	**9-1891-8**	120.00	**9-1891-8**	**9-1891-8**	120.00	—	—	—
24V 60 Hz – 24V 50 Hz	**T**	—	—	—	—	—	—	—	—	—
24V 60 Hz	**T**	**9-1891-15**	**9-1891-15**	120.00	**9-1891-15**	**9-1891-15**	120.00	—	—	—
24V 50 Hz	**U**	**9-1891-16**	**9-1891-16**	120.00	**9-1891-16**	**9-1891-16**	120.00	—	—	—
32V 50 Hz	**V**	**9-1891-27**	**9-1891-27**	120.00	**9-1891-27**	**9-1891-27**	120.00	—	—	—
48V 60 Hz	**W**	—	—	—	—	—	—	**9-2698-8**	**9-2698-8**	805.00
48V 50 Hz	**Y**	**9-1891-18**	**9-1891-18**	120.00	**9-1891-18**	**9-1891-18**	120.00	—	—	—
Overload Relays										
For replacement on existing starters 3-Pole — Ambient Compensated Bimetallic		**10-6530-4**	**10-6530-4**	289.00	**C306DN3B**	**C306DN3B**	70.50	**C306DN3B**	**C306DN3B**	70.50
Current Transformer										
		—	—	—	**42-3564**	**42-3564**	445.00	**42-3598**	**42-3598**	328.00
Magnet Frame Armature										
Lower Magnet Frame		**48-1030**	**48-1030**	91.50	**48-1030**	**48-1030**	91.50	—	—	—
Upper Magnet Frame		**48-1029-3**	**48-1029-3**	71.00	**48-1029-3**	**48-1029-3**	71.00	—	—	—

Description		NEMA Size 7		Price U.S. $	NEMA Size 8		Price U.S. $
		Series A1	Series B1		Series A1	Series B1	
		Part No.	Part No.		Part No.	Part No.	
Renewal Parts Publication Number		**20848**	**20848**		**20849**	**20849**	
Contact Kits							
2-Pole		—	—		—	—	
3-Pole		**6-613**	**6-613**	4,270.00	**6-571**	**6-571**	4,720.00
Magnet Coils	**Coil Suffix**						
120V 60 Hz or 110V 50 Hz	**A**	**9-2698**	**9-2698**	805.00	**9-2654**	**9-2654**	1,325.00
240V 60 Hz or 220V 50 Hz	**B**	**9-2698-2**	**9-2698-2**	805.00	**9-2654-2**	**9-2654-2**	1,325.00
480V 60 Hz or 440V 50 Hz	**C**	**9-2698-3**	**9-2698-3**	805.00	**9-2654-3**	**9-2654-3**	1,325.00
600V 60 Hz or 550V 50 Hz	**D**	**9-2698-4**	**9-2698-4**	805.00	**9-2654-4**	**9-2654-4**	1,325.00
208V 60 Hz	**E**	**9-2698-5**	**9-2698-5**	805.00	**9-2654-6**	**9-2654-6**	1,325.00
277V 60 Hz	**H**	—	—	—	—	—	—
208/240V 60Hz	**J**	—	—	—	—	—	—
240V 50Hz	**K**	—	—	—	—	—	—
380 – 415V 50 Hz	**L**	—	—	—	—	—	—
380V 50 Hz	**L**	**9-2698-6**	**9-2698-6**	805.00	**9-2654-5**	**9-2654-5**	1,325.00
415V 50 Hz	**M**	—	—	—	—	—	—
550V 50 Hz	**N**	—	—	—	—	—	—
24V 60 Hz – 24V 50 Hz	**T**	—	—	—	—	—	—
24V 60 Hz	**T**	—	—	—	—	—	—
24V 50 Hz	**U**	—	—	—	—	—	—
32V 50 Hz	**V**	—	—	—	—	—	—
48V 60 Hz	**W**	—	—	—	—	—	—
48V 50 Hz	**Y**	—	—	—	—	—	—
Overload Relays							
For replacement on existing starters 3-Pole — Ambient Compensated Bimetallic		**C306DN3B**	**C306DN3B**	70.50	**C306DN3B**	**C306DN3B**	70.50
Magnet Frame Armature ②							
Lower Magnet Frame		—	—	—	—	—	—
Upper Magnet Frame		—	—	—	—	—	—

① CN35A = Size 00, CN35B and CN35D = Size 0, CN35G = Size 2, CN35K = Size 3, CN35N = Size 4, and CN35S = Size 5.
② Consult factory.

Discount Symbol **1CD1C**

Non-reversing Contactors

Table 33-54. Approximate Dimensions and Shipping Weights — Open Type

NEMA Size	Number of Poles	Dimensions in Inches (mm)							Ship Wt. Lbs. (kg)
		Wide A	High B	Deep C	Mounting D	Mounting E	F	G	
00	2 – 4	1.75 (44.5)	3.88 (98.6)	3.49 (88.6)	1.50 (38.1) ①	3.38 (85.9)	4.62 (117.3)	.54 (13.7)	1.7 (.8)
0	2 – 3	1.75 (44.5)	3.88 (98.6)	3.49 (88.6)	1.50 (38.1) ①	3.38 (85.9)	4.62 (117.3)	.54 (13.7)	1.8 (.8)
1 – 2	2 – 3	2.56 (65.0)	5.05 (128.3)	4.44 (112.8)	2.00 (50.8) ①	4.50 (114.3)	5.80 (147.3)	.54 (13.7)	3.1 (1.4)
1 – 2	4	3.44 (87.4)	5.05 (128.3)	4.44 (112.8)	2.00 (50.8) ①	4.50 (114.3)	5.80 (147.3)	.54 (13.7)	3.6 (1.6)
1 – 2	5	4.32 (109.7)	5.05 (128.3)	4.44 (112.8)	2.00 (50.8) ①	4.50 (114.3)	5.80 (147.3)	.54 (13.7)	4.0 (1.8)
3	2 – 3	4.08 (103.6)	7.17 (182.1)	5.94 (150.9)	3.00 (76.2)	6.63 (168.4)	—	—	8.5 (3.9)
4	2 – 3	7.05 (179.1)	9.11 (231.4)	7.25 (184.2)	6.00 (152.4)	8.50 (215.9)	—	—	20.0 (9.1)
5	2 – 3	7.05 (179.1)	13.12 (333.2)	7.78 (197.6)	6.00 (152.4)	12.50 (317.5)	—	—	23.0 (10.4)
6	3	8.63 (219.2)	13.54 (343.9)	8.88 (225.6)	4.33 (110.0)	8.63 (219.2)	—	—	35.0 (15.9)
7	3	11.02 (279.9)	19.30 (490.2)	11.46 (291.1)	6.89 (175.0)	11.02 (279.9)	—	—	100.0 (45.4)
8	3	13.00 (330.2)	24.50 (622.3)	13.63 (346.2)	4.22 (107.2)	14.86 (377.4)	—	—	160.0 (72.6)

① Center mounting slot at bottom supplied only on Size 00 and 0 contactors.

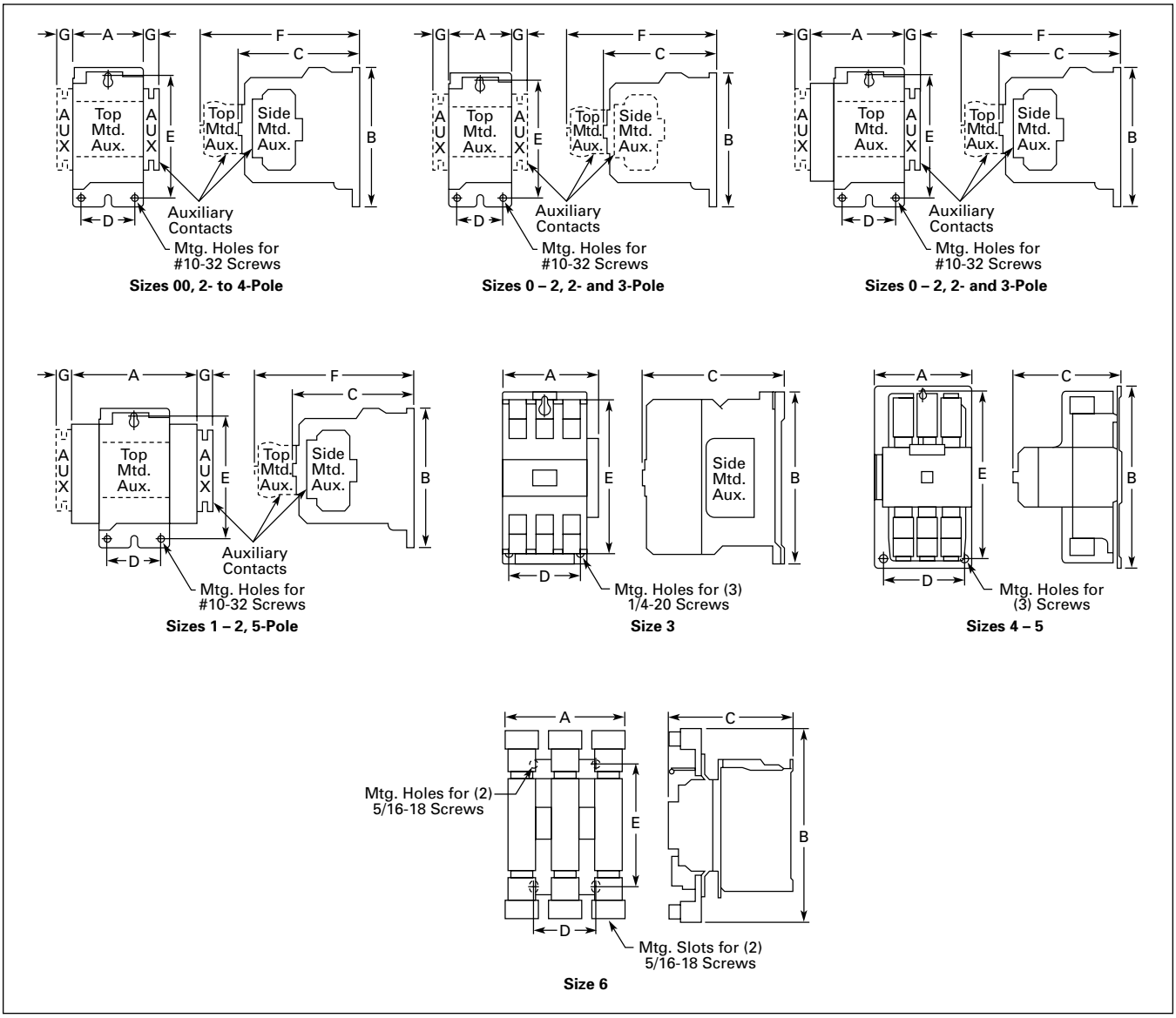


Figure 33-11. Approximate Dimensions

Reversing Contactors

Table 33-55. Approximate Dimensions and Shipping Weights — Open Type

NEMA Size	Dimensions in Inches (mm)							Ship Wt. Lbs. (kg)
	Wide A	High B	Deep C	Mounting D	Mounting E	F	G	
00 – 0	4.20 (106.7)	4.35 (110.5)	3.52 (89.4)	3.50 (88.9)	3.86 (98.0)	4.90 (124.5)	.54 (13.7)	3.3 (1.5)
1 – 2	5.71 (145.0)	5.05 (128.3)	4.44 (112.8)	5.25 (133.4)	3.63 (92.2)	5.80 (147.3)	.54 (13.7)	7.8 (3.5)
3	8.70 (221.0)	7.17 (182.1)	5.94 (150.9)	7.00 (177.8)	6.63 (168.4)	—	—	17.0 (7.7)
4	14.68 (372.9)	9.11 (231.4)	7.25 (184.2)	13.50 (342.9)	8.50 (215.9)	—	—	47.0 (21.3)
5	14.50 (368.3)	12.25 (311.2)	7.78 (197.6)	13.50 (342.9)	11.50 (292.1)	—	—	63.0 (28.6)
6	19.77 (502.2)	16.61 (421.9)	9.90 (251.5)	18.00 (457.2)	12.00 (304.8)	—	—	80.0 (36.3)
7	28.00 (711.2)	26.75 (679.5) ①	12.75 (323.9)	12.75 (323.9)	11.00 (279.4)	—	—	260.0 (118.0)
8	30.13 (765.3)	39.00 (990.6) ①	14.69 (373.1)	14.13 (358.9)	15.00 (381.0)	—	—	350.0 (158.9)

① Includes cross wiring.

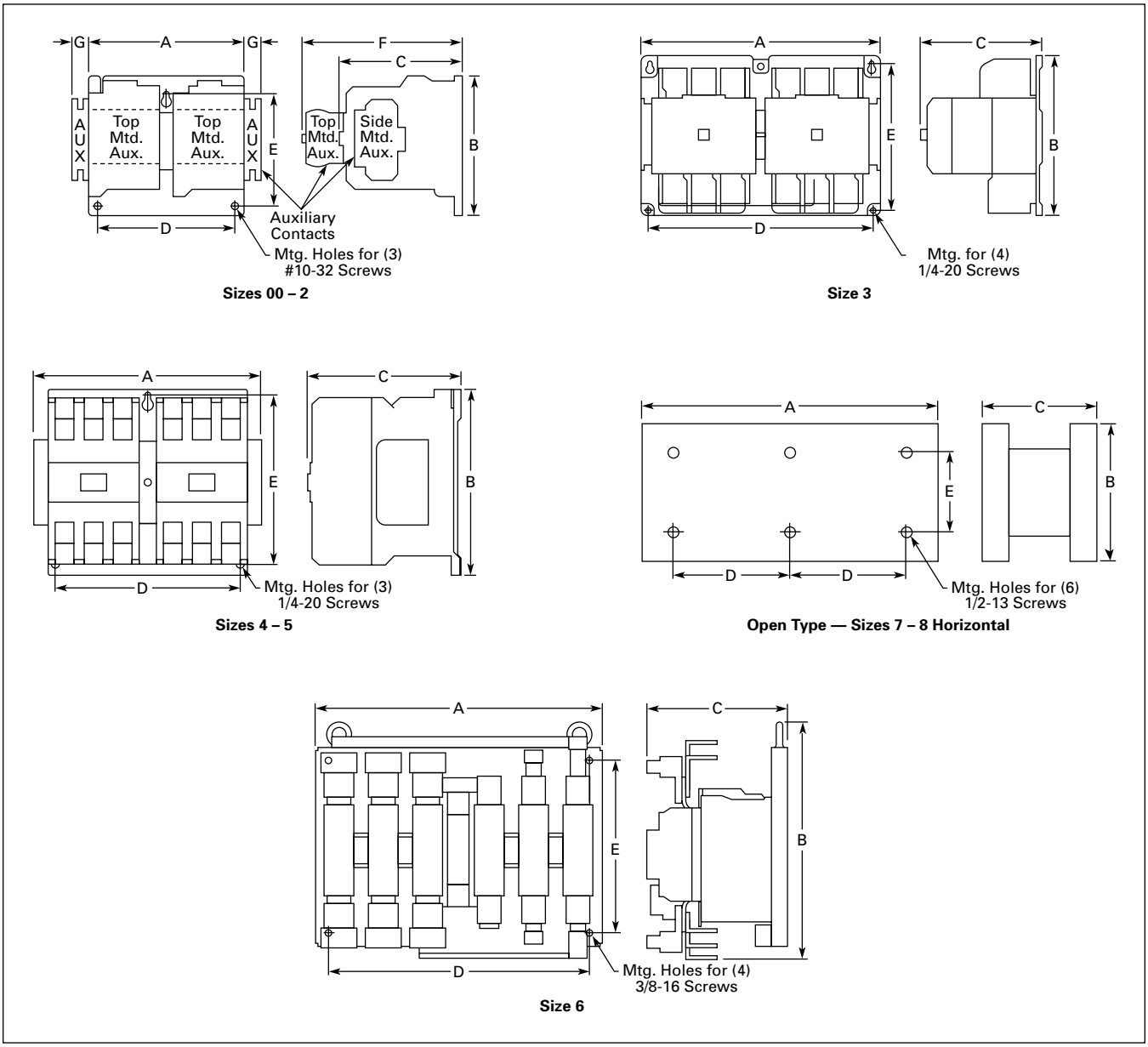


Figure 33-12. Approximate Dimensions

Non-reversing Starters

Table 33-56. Approximate Dimensions and Shipping Weights — Open Type

NEMA Size	Dimensions in Inches (mm)							Ship. Wt. Lbs. (kg)
	Wide A	High B	Deep C	Mounting D	Mounting E	F	G	
00 – 0	1.80 (45.7)	6.60 (167.6)	3.52 (89.4)	—	6.07 (154.2)	4.90 (124.5)	.54 (13.7)	2.2 (1.0)
1 – 1P	2.56 (65.0)	7.08 (179.8)	4.44 (112.8)	2.00 (50.8)	6.63 (168.4)	5.80 (147.3)	.54 (13.7)	4.5 (2.0)
2	2.56 (65.0)	8.08 (205.2)	4.44 (112.8)	2.00 (50.8)	7.63 (193.8)	5.80 (147.3)	.54 (13.7)	4.7 (2.1)
3	4.08 (103.6)	11.35 (288.3)	5.94 (150.9)	3.00 (76.2)	10.81 (274.6)	—	—	11.0 (5.0)
4	7.05 (179.1)	12.06 (306.3)	7.25 (184.2)	6.00 (152.4)	8.50 (215.9)	—	—	23.0 (10.4)
5	7.00 (177.8)	17.77 (451.4)	7.76 (197.1)	6.00 (152.4)	16.00 (406.4)	—	—	36.0 (16.3)
6	9.47 (240.5)	21.69 (550.9)	9.90 (251.5)	3.10 (78.7)	18.00 (457.2)	—	—	75.0 (34.1)
7	15.13 (384.3)	29.13 (739.9)	12.64 (321.1)	13.25 (336.6)	21.25 (539.8)	—	—	120.0 (54.5)
8	15.13 (384.3)	34.50 (876.3)	15.00 (381.0)	13.25 (336.6)	16.75 (425.5)	—	—	210.0 (95.3)

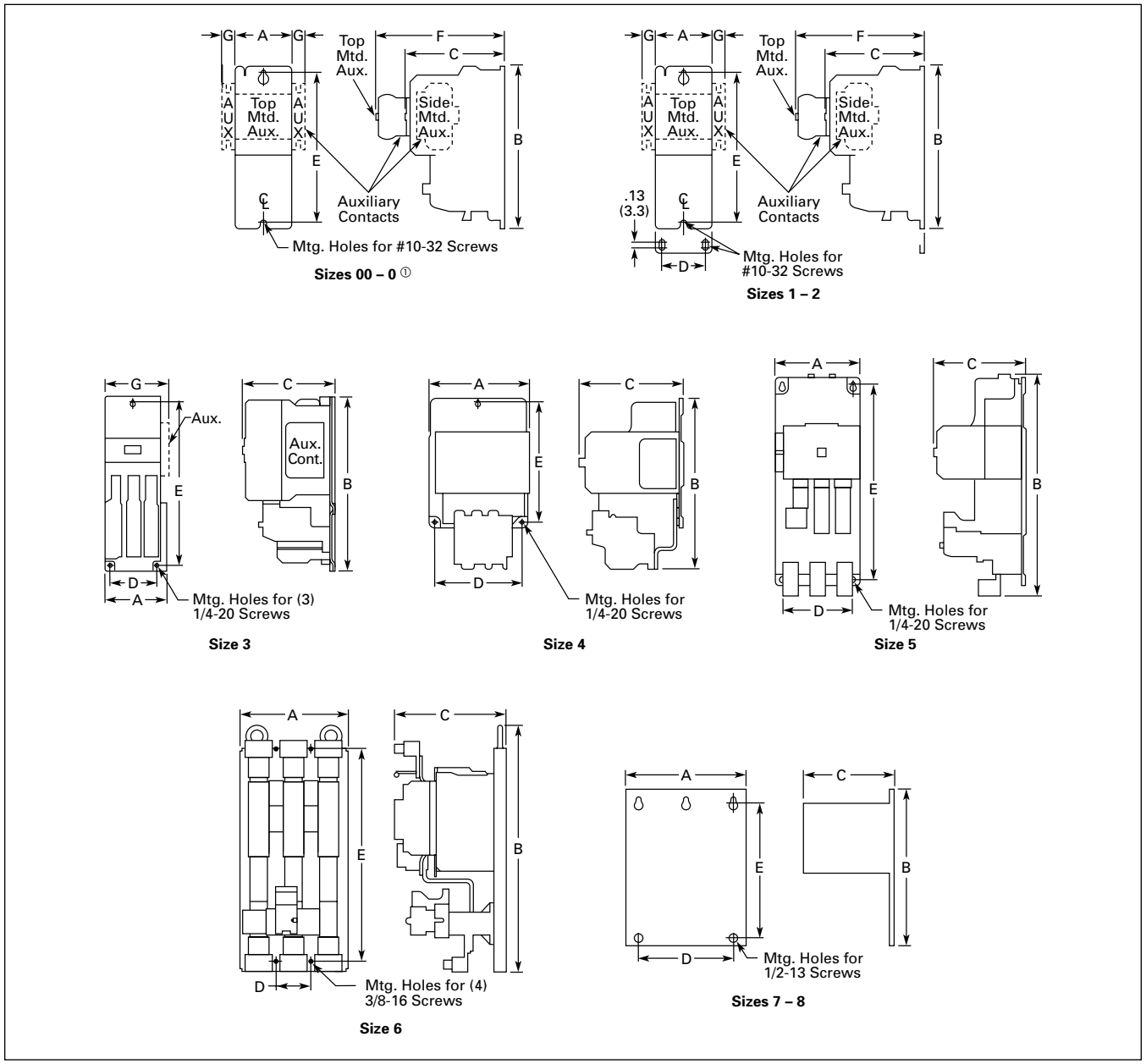


Figure 33-13. Approximate Dimensions

① Holding circuit contact for Size 00 occupies 4th power pole position — no increase in width.

Reversing Starters

Table 33-57. Approximate Dimensions and Shipping Weights — Open Type

NEMA Size	Dimensions in Inches (mm)									Ship.Wt. Lbs. (kg)
	Wide A	High B	Deep C	Mounting D	Mounting E	D1	E1	F	G	
00 – 0	4.20 (106.7)	7.38 (187.5)	3.52 (89.4)	3.50 (88.9)	6.87 (174.5)	—	—	4.90 (124.5)	.54 (13.7)	3.6 (1.6)
1	5.71 (145.0)	7.08 (179.8)	4.44 (112.8)	5.25 (133.4)	5.75 (146.1)	—	—	5.80 (147.3)	.54 (13.7)	8.3 (3.8)
2	5.71 (145.0)	8.08 (205.2)	4.44 (112.8)	5.25 (133.4)	6.75 (171.5)	—	—	5.80 (147.3)	.54 (13.7)	8.5 (3.9)
3	8.70 (221.0)	11.35 (288.3)	5.94 (150.9)	7.00 (177.8)	10.81 (274.6)	—	—	—	—	20.0 (9.1)
4	14.68 (372.9)	12.06 (306.3)	7.25 (184.2)	13.50 (342.9)	8.50 (215.9)	—	—	—	—	49.0 (22.2)
5	14.50 (368.3)	17.77 (451.4)	7.76 (197.1)	13.50 (342.9)	16.00 (406.4)	—	—	—	—	68.0 (30.9)
6	19.77 (502.2)	22.63 (574.8)	9.90 (251.5)	18.00 (457.2)	12.00 (304.8)	3.10 (78.7)	18.00 (457.2)	—	—	90.0 (40.9)
7	28.06 (712.7)	32.13 (816.1) ①	12.70 (322.6)	12.75 (323.9)	21.25 (539.8)	—	—	—	—	175.0 (79.5)
8	30.38 (771.7)	41.50 (1054.1) ①	14.70 (373.4)	14.13 (358.9)	16.75 (425.5)	—	—	—	—	430.0 (195.2)

① Includes cross wiring overhang.

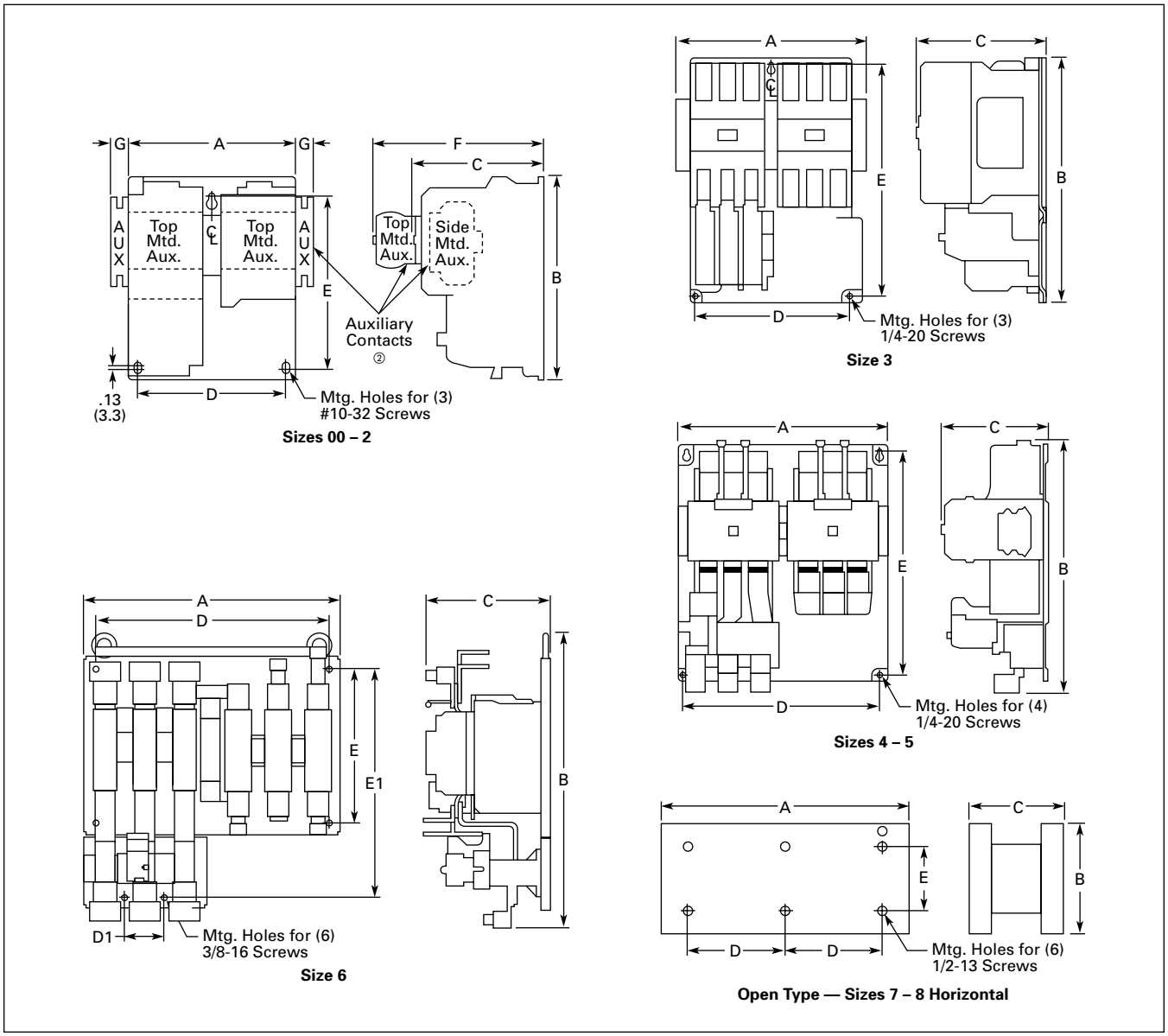


Figure 33-14. Approximate Dimensions

② See catalog listings for type and location of auxiliary contacts supplied with a particular starter.

Reversing Starters — Vertical Construction

Table 33-58. Approximate Dimensions and Shipping Weights — AN56V Open Vertical Starter

NEMA Size	Dimensions in Inches (mm)						Ship. Wt. Lbs. (kg)
	Wide A	High B	Deep C	Mounting		Wire Zone	
				Wide D	High E		
0	4.25 (108.0)	12.05 (306.1)	3.84 (97.5)	2.00 (50.8)	11.50 (292.1)	—	4.0 (1.8)
1	4.25 (108.0)	12.05 (306.1)	3.86 (98.0)	2.00 (50.8)	11.50 (292.1)	1.00 (25.4)	9.0 (4.1)
2	4.25 (108.0)	12.05 (306.1)	3.86 (98.0)	2.00 (50.8)	11.50 (292.1)	1.00 (25.4)	9.5 (4.3)
3	9.25 (235.0)	16.75 (425.5)	5.18 (131.6)	7.15 (181.6)	16.07 (408.2)	①	21.0 (9.5)
4	9.08 (230.6)	19.84 (503.9)	5.18 (131.6)	8.00 (203.2)	18.51 (470.2)	1.50 (38.1)	50.0 (22.7)

① Wire overhang 1.00 mm left, 50 mm right.

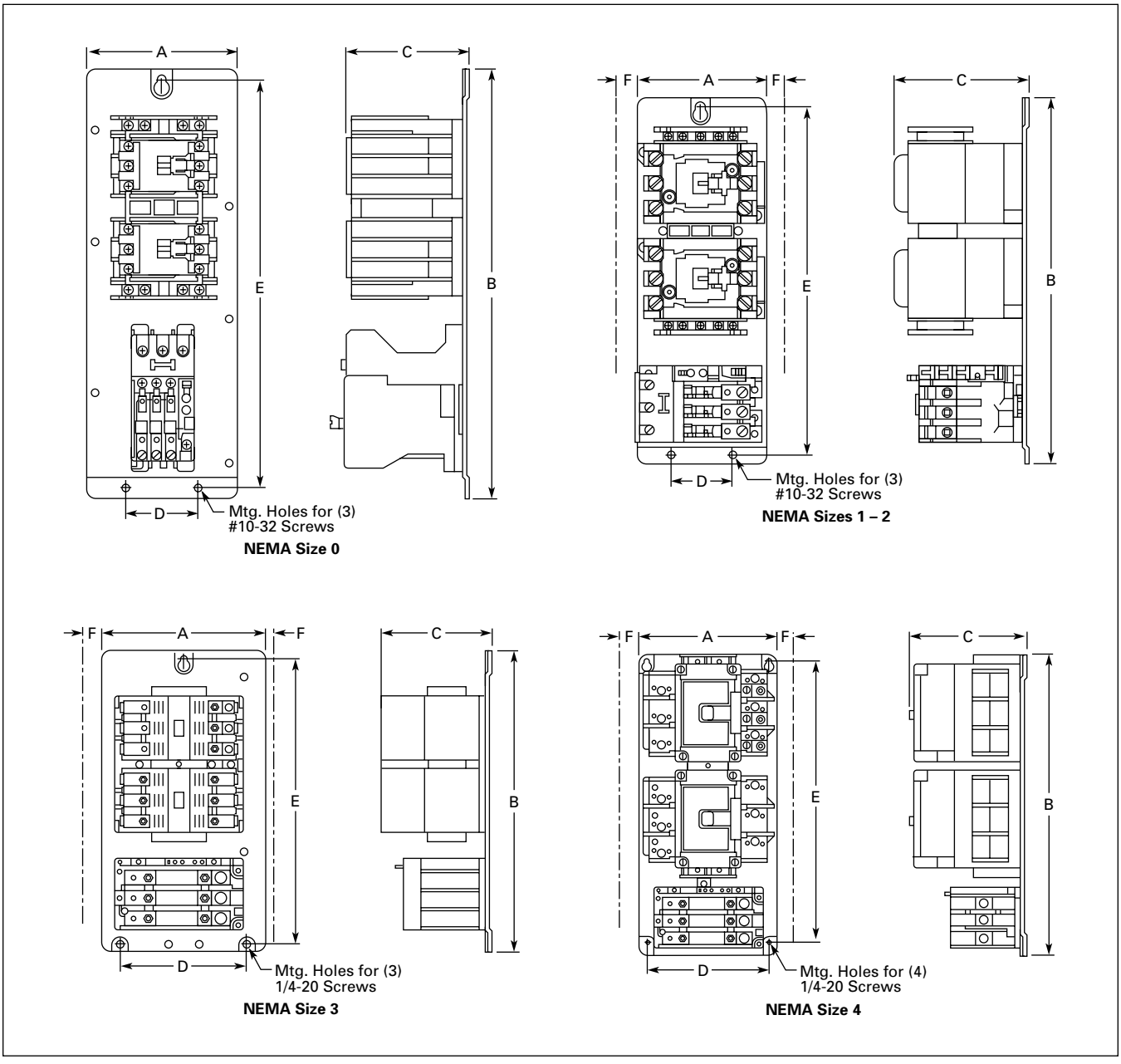


Figure 33-15. Approximate Dimensions

Multispeed Starters

Table 33-59. Approximate Dimensions and Shipping Weights — AN700 Open Vertical Starter

NEMA Size	Dimensions in Inches (mm)						Ship Wt. Lbs. (kg)
	Wide A	High B	Deep C	Mounting		Wire Zone F	
				Wide D	High E		
2-Speed — Selective Control — Separate Winding							
0	5.19 (132)	7.38 (188)	3.52 (89)	3.50 (89)	6.87 (175)	.89 (23)	4.5 (2.0)
1	5.66 (144)	7.08 (180)	4.42 (112)	5.25 (133)	5.75 (146)	1.23 (31)	9.0 (4.1)
2	5.66 (144)	8.08 (205)	4.42 (112)	5.25 (133)	6.75 (165)	1.63 (41)	10.0 (4.5)
3	8.72 (221)	11.35 (288)	5.89 (150)	7.00 (178)	10.81 (275)	1.77 (45)	24.0 (10.9)
4	14.68 (373)	12.06 (306)	7.25 (184)	13.50 (343)	8.50 (216)	1.95 (50)	53.0 (24.1)
5	14.50 (368)	17.82 (453)	7.76 (197)	13.50 (343)	16.00 (406)	4.56 (116)	73.0 (33.1)
2-Speed — Selective Control — Reconnectable Winding							
0	8.62 (219)	7.06 (179)	3.82 (81)	6.62 (168)	6.50 (165)	.50 (13)	6.0 (2.7)
1	8.97 (228)	7.12 (181)	4.72 (120)	6.62 (168)	6.50 (165)	1.04 (26)	10.0 (4.5)
2	8.90 (226)	8.62 (219)	4.75 (121)	8.40 (213)	8.12 (206)	1.03 (26)	11.0 (5.0)
3	16.00 (406)	13.46 (342)	6.38 (162)	15.00 (381)	12.25 (311)	1.24 (31)	31.0 (14.1)
4	15.46 (393)	31.00 (787)	7.74 (197)	13.50 (343)	30.00 (762)	1.84 (47)	72.0 (32.7)

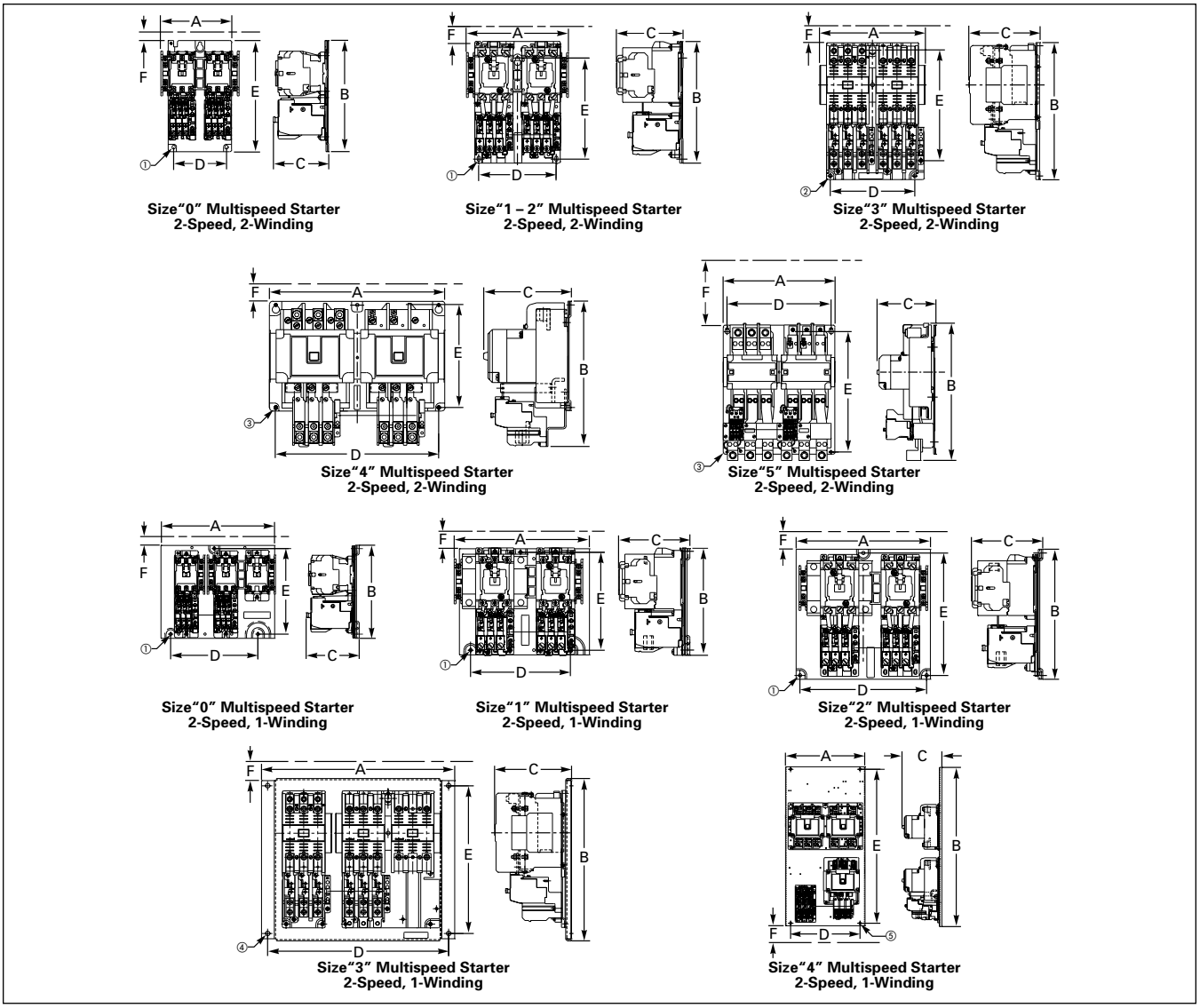


Figure 33-16. Approximate Dimensions

① Mounting holes for (3) #10 screws.
② Mounting holes for (3) 1/4-20 screws.
③ Mounting holes for (4) 1/4-20 screws.
④ Mounting holes for (4) 5/16 screws.
⑤ Mounting holes for (4) 3/8 screws.

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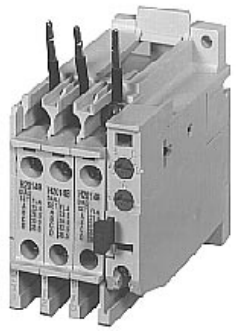


32A Overload
Cat. No. C306DN3B

Product Description

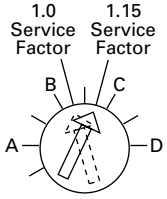
C306 Overload Relays are designed for use with CE or CN non-reversing and reversing contactors. Four sizes are available for overload protection up to 144A.

Features

- Selectable Manual or Automatic Reset operation.
- Interchangeable Heater Packs adjustable ±24% to match motor FLA and calibrated for use with 1.0 and 1.15 service factor motors. Heater packs for 32A overload relay will mount in 75A overload relay — useful in derating applications such as jogging.
- Class 10 or 20 heater packs.
- Load lugs built into relay base.
- Bimetallic, ambient compensated operated. Trip free mechanism.
- Electrically isolated NO-NC contacts (pull RESET button to test).
- Overload trip indication.
- Shrouded or fingerproof terminals to reduce possibility of electrical shock.
- Meets UL 508 single-phasing requirements.
- UL listed, CSA certified, NEMA compliance and CE mark.

Operation

C306 Overload Relay Setting



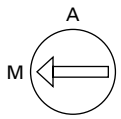
Example of 12.0 FLA setting for heater pack number H2011B showing position for 1.0 or 1.15 service factor motors.

Figure 33-17. FLA Dial Adjustment

For motors having a 1.15 service factor, rotate the FLA adjustment dial to correspond to the motor's FLA rating.

Estimate the dial position when the motor FLA falls between two letter values as shown in the example.

For motors having a 1.0 service factor, rotate the FLA dial one-half position counterclockwise (CCW).



Example of setting for manual reset.

Figure 33-18. Manual/Automatic Reset

The overload relay is factory set at M for manual reset operation. For automatic reset operation, turn the reset adjustment dial to the A position as shown in the illustration.

Automatic reset is not intended for two-wire control devices.

Test for Trip Indication

To test overload relay for trip indication when in manual reset, pull out the blue reset button. An orange flag will appear indicating that the device has tripped. Push reset button in to reset.

Warning — To provide continued protection against fire or shock hazard, the complete overload relay must be replaced if burnout of the heater element occurs.

Technical Information

General

"Overload relays are provided to protect motors, motor control apparatus and motor-branch circuit conductors against excessive heating due to motor overloads and failure to start. This definition does not include: 1) motor circuits over 600V, 2) short circuits, 3) ground faults and 4) fire pump control." (NEC Art. 430-31)

Time Current Characteristics

The time-current characteristics of an overload relay is an expression of performance which defines its operating time at various multiples of its current setting. Tests are run at Underwriters Laboratories (UL) in accordance with NEMA Standards and the NEC. UL requires:

- When tested at 100 percent of its current rating, the overload relay shall trip ultimately.
- When tested at 200 percent of its current rating, the overload relay shall trip in not more than 8 minutes.
- When tested at 600 percent of the current rating, the overload relay shall trip in not more than 10 or 20 seconds, depending on the Class of the relay.

"Current Rating" is defined as the minimum current at which the relay will trip. Per NEC, an overload must ultimately trip at 125% of FLA current (heater) setting for a 1.15 service factor motor and 115% FLA for a 1.0 service factor motor.

"Current Setting" is defined as the FLA (Full Load Amperes) of the motor and thus the overload heater pack setting.

Example: 600% of current rating is defined as 750% (600 x 1.25) of FLA current (heater) setting for a 1.15 service factor motor. A 10A heater setting must trip in 20 seconds or less at 75A motor current for a Class 20 relay.

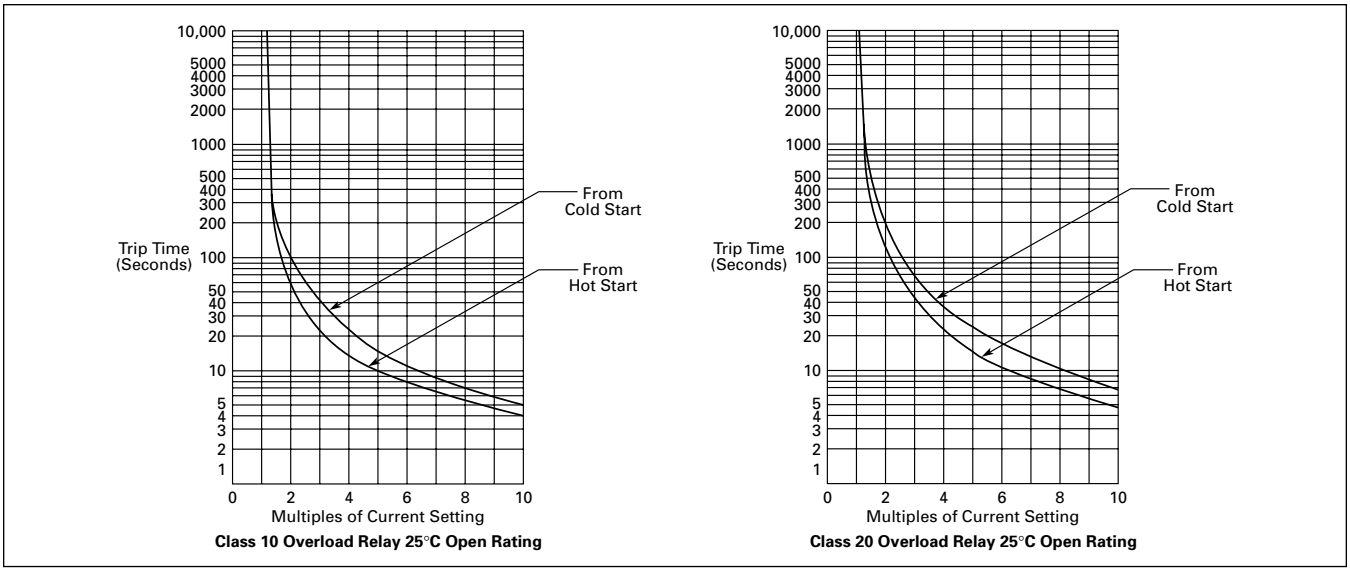


Figure 33-19. Class 10 and Class 20 Trip Curves

Technical Data

Table 33-60. Wire (75°C) Sizes — AWG or kcmil — NEMA Sizes 00 – 2, IEC A – K — Open

IEC Size	NEMA Size	Cu Only
Power Terminals — Line		
A, B, C	00	12 – 16 Stranded, 12 – 14 Solid
D, E, F	0	8 – 16 Stranded, 10 – 14 Solid
	1	8 – 14 Stranded or Solid
G, H, J, K	2	3 – 14 (Upper) and/or 6 – 14 (Lower) Stranded or Solid ①
Power Terminals — Load — Cu Only (Stranded or Solid)		
Catalog Number	**Terminal**	**Wire Size**
C306DN3B	32A	14 – 6 AWG
C306GN3B	75A	14 – 2 AWG
Control Terminals — Cu Only		
12 – 16 AWG Stranded, 12 – 14 AWG Solid		

① Two compartment box lug.

Table 33-61. Wire (75°C) Sizes — AWG or kcmil — NEMA Sizes 3 – 8, IEC L – N — Open

IEC Size	NEMA Size	Wire Size
Power Terminals — Line and Load		
L	3	1/0 – 14 Cu/Al
M	—	1/0 – 8 Cu/Al
N	—	3/0 – 8 Cu/Al
—	4	Open — 3/0 – 8 Cu Enclosed — 250 kcmil — 6 Cu/Al
—	5	750 kcmil — 2 or (2) 250 kcmil — 3/0 Cu/Al
	6 – 7	(2) 750 kcmil — 3/0 Cu/Al
	8	(2) 750 kcmil — 1/0 Cu/Al
Control Terminals — Cu Only		
12 – 16 AWG Stranded, 12 – 14 AWG Solid		

Table 33-62. Power Terminal Torque Line and Load Terminals

Terminal	Catalog Number	Torque in lb-in
32A	**C306DT3B**	20
75A	**C306GT3B**	35 (14 – 10 AWG) 40 (8 AWG) 45 (6 – 4 AWG) 50 (3 – 2 AWG)
105A	**C306KN3**	(Socket Head Screw) 120 (3/16) 200 (1/4) 250 (5/16)
144A	**C306NN3**	(Socket Head Screw) 120 (3/16) 200 (1/4) 250 (5/16) (Slotted Head Screw) 35 (14 – 10 AWG) 40 (8 AWG) 45 (6 – 4 AWG) 50 (3 – 1/0 AWG)

Table 33-63. Plugging and Jogging Service Horsepower Ratings ②

NEMA Size	200V	230V	460V	575V
00	—	1/2	1/2	1/2
0	1-1/2	1-1/2	2	2
1	3	3	5	5
2	7-1/2	10	15	15
3	15	20	30	30
4	25	30	60	60
5	60	75	150	150
6	125	150	300	300

② Maximum horsepower where operation is interrupted more than 5 times per minute or more than 10 times in a 10 minute period. NEMA standard ICS 2-1993 table 2-4-3.

Technical Data (Continued)

Table 33-64. Overload Relay UL/CSA Contact Ratings Control Circuit ①

AC Volts	120V	240V	480V	600V
NC Contact B600				
Make and Break Amps	30	15	7.5	6
Break Amps	3	1.5	.75	.6
Continuous Amps	5	5	5	5
NO Contact C600				
Make and Break Amps	15	7.5	3.375	3
Break Amps	1.5	.75	.375	.3
Continuous Amps	2.5	2.5	2.5	2.5

① DC ratings cover Freedom Series coils only.

Factory Modifications

C306 Thermal Overload Relays with Mounting Adapter

Consists of a thermal overload relay mounted to a terminal base adapter — permits fast and easy installation.

Table 33-65. Product Selection

Description	Catalog Number	Price U.S. $
C306DN3B + C306TB1	**C306DT3B**	81.00
C306GN3B + C306TB2B	**C306GT3B**	141.00

Accessories

DIN Rail and Panel Mounting Adapter

These adapters are required when component overload relays are to be separately mounted. The terminal base adapter includes line terminals and connects with the overload relays on **Page 33-36**.

Cat. No. C306TB1

Table 33-66. Product Selection

Description	Catalog Number	Price U.S. $
For 32A Overload Relay	**C306TB1**	10.10
For 75A Overload Relay	**C306TB2B** ②	20.10

② This Series B adapter will accept Series A or B overload relays (C306GN3 or C306GN3B), C306TB2 can only be used with C306GN3.

Locking Cover for Overload Relay — C306 Only

Snap-on transparent or opaque plastic panel for covering access port to the overload relay trip setting dial — helps prevent accidental or unauthorized changes to trip and reset setting.

Table 33-67. Product Selection

Description	Min. Order Qty. (Std. Pkg.)	Catalog Number	Price U.S. $
Clear cover, no accessibility	50	**C320PC3**	.86
Gray cover, no accessibility w/Auto only nib	50	**C320PC4**	.86
Gray cover, no accessibility, w/Manual only nib	50	**C320PC5**	.86
Gray cover with FLA dial accessibility, A, B, C, D positions and Auto only nib	50	**C320PC6**	.86
Gray cover with FLA dial accessibility, A, B, C, D positions and Manual only nib	50	**C320PC7**	.86

Replacement Parts

Heater Pack Replacement

For replacement of heater packs with built-in load lugs. Series A or prior heater packs have load lugs built in.

Superseded Series A Heater Pack

Table 33-68. Heater Pack Requirements

Existing Heater Pack Catalog Numbers	Product Required
H2001A-3 – H2014A-3 **H2001-3 – H2014-3** **H2101-3 – H2113-3**	Order identical Heater Pack Catalog Number — see note below
H2015A-3 – H2017A-3 **H2018-3 – H2024-3** **H2114-3 – H2117-3**	Order identical Heater Pack Catalog Number
H2015-3 – H2017-3	Choose Heater Pack from table below

Note: When inventory of the previous series heater packs is exhausted, a Series B replacement kit will be provided under the same catalog number. This kit will include the equivalent Series B heater pack, Catalog Number C306KAL1-3 lug adapters and installation instructions. This kit can be used in Series AI overload relays that do not have load lugs built in.

Table 33-69. Heater Pack Ratings

Motor Full Load Ampere Rating				Order Heater Pack Catalog Number	Price U.S. $
Dial Position					
A	B	C	D		
29.0	32.5	36.0	39.5	**H2015A-3**	30.50
39.6	44.3	49.1	53.8	**H2016A-3**	30.50
53.9	60.4	66.8	74.9	**H2017A-3**	30.50

Discount Symbol **1CD1C**

Overload Relay Lug Adapter Kit

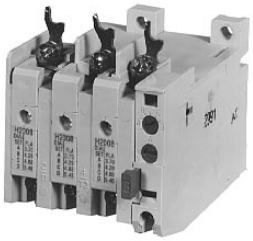
Cat. No. C306KAL1-3
Overload Relay
Lug Adapter Kit

These kits are used in conjunction with Catalog Numbers H2001B – H2014B or H2101B – H2114B heater packs as a means of utilizing these Series B heater packs in Catalog Numbers C306DN3 and C306GN3 Series AI overload relays. The kit consists of 3 lug adapters and installation instructions. When installing Series B heater packs plus lug adapters in Series A overload relays, refer to heater pack FLA adjustment tables originally supplied with equipment (also supplied with kit).

Table 33-70. Product Selection — Overload Relay Lug

Description	Catalog Number	Price U.S. $
Series AI Overload Relay Lug Adapter Kit	**C306KAL1-3B**	6.75

Superseded 32A Series A
Overload Relay
Cat. No. C306DN3



Superseded 75A Series A
Overload Relay
Cat. No. C306GN3

Overload Relay Replacement — Series A Only

When replacing a Catalog Number C306DN3 (Part No. 10-6044) or C306GN3 (10-6319) Series A overload relay on a starter, order a Series B overload relay and Series B heater packs.

Dimensions

Table 33-71. Stand-Alone Overload Relays — Approximate Dimensions and Shipping Weight

Ampere Size	Dimensions in Inches (mm)							Ship. Wt. Lbs. (kg)
	Wide A	High B	Deep C	Mounting				
				D	E	F (Slot)	G (Hole)	
32A	1.77 (45.0)	4.13 (104.9)	3.69 (93.7)	1.36 (34.5)	3.74 (95.0)	.18 x .30 (4.6 x 7.6)	.18 (4.6) Dia.	.8 (.4)
75A	2.54 (64.5)	4.69 (119.1)	3.74 (95.0)	2.00 (50.8)	3.45 (87.6)	.22 x .26 (5.6 x 6.6)	.21 (5.3) Dia.	1.4 (.6)
105 & 144A	4.00 (101.6)	7.17 (182.1)	4.91 (124.7)	3.00 (76.2)	6.62 (168.1)	—	—	4.0 (1.8)

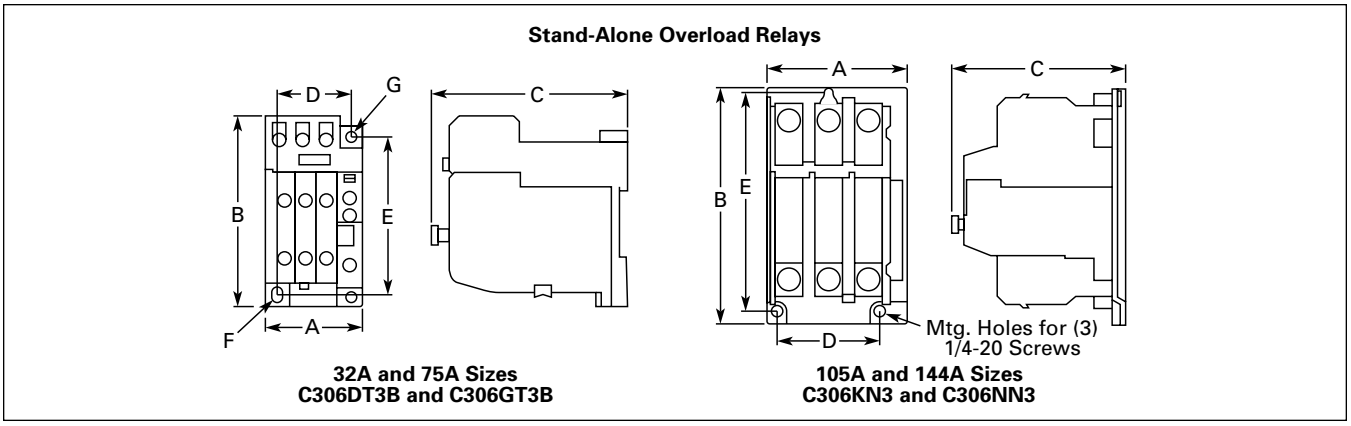
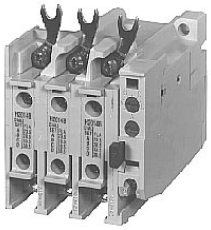


Figure 33-20. Approximate Dimensions — Stand-Alone Overload Relays

Discount Symbol **1CD1C**

Product Selection



75A Overload
Cat. No. C306GN3B

Table 33-72. C306 Thermal Overload Relays

For Use with Freedom Series Contactors		Maximum Ampere Rating	Number of Poles	Open Type		NEMA 1 Enclosed	
NEMA	IEC			Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
00, 0	A – F	32 ②	3	**C306DN3B**	70.50	**C306DG3B**	97.50
1, 2	G – K	75 ②	3	**C306GN3B**	122.00	**C306GG3B**	174.00
3	L – M	105 ③	3	**C306KN3**	174.00	**—**	—
4	N	144 ③	3	**C306NN3**	242.00		
5 – 8 ①	—	—	—	**—**	—		

① NEMA Sizes 5 – 8 use the 32A overload in conjunction with CTs.
② Series B overload relays have load lugs built into relay base and will only accept Series B heater packs. These relays can be directly attached to contactor or they can be DIN rail mounted using adapter on **Page 33-34**.
③ These relays can be panel mounted only.

Heater Pack
H2001B – H2017B

Heater Pack
H2101B – H2117B

Heater Pack
H2018 – H2024

Table 33-73. Starters with Series B Overload Relays

NEMA — AN Type		IEC — AE Type	
Size	Series	Size	Series
00 – 0	**C**	A – F	**C**
1 – 2	**B**	G – K	**B**
5	**B**		
6	**C**		
7 – 8	**B**		

Note: The series of a starter is the last digit of the listed Catalog Number. EXAMPLE: AN16DN0A**B**.

Heater Pack Selection

Heater packs H2001B to H2017B and H2101B to H2117B are to be used only with Series B overload relays Catalog Numbers C306DN3B (Part No. 10-7016) and C306GN3B (Part No. 10-7020). The load lugs are built into the overload relay base to allow load wiring prior to heater pack installation. The previous heater design had integral load lugs. The Series B heater packs are electrically equivalent to the previous heater design. Heaters H2018-3 to H2024-3 have not changed.

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Discount Symbol **1CD1C**

Table 33-74. Standard Trip — Class 20 Heater Selection

Overload Relay Size	Motor Full Load Ampere Rating — Dial Position A	B	C	D	Catalog Number (Includes 3 Heater Packs) ①	Price U.S. $
For Use with NEMA Sizes 00 – 0 Series C, NEMA Sizes 1 – 2 Series B; IEC Sizes A – F Series C, IEC Sizes G – K Series B						
32A or 75A	.254	.306	.359	.411	**H2001B-3**	30.50
	.375	.452	.530	.607	**H2002B-3**	30.50
	.560	.676	.791	.907	**H2003B-3**	30.50
	.814	.983	1.15	1.32	**H2004B-3**	30.50
	1.20	1.45	1.71	1.96	**H2005B-3**	30.50
	1.79	2.16	2.53	2.90	**H2006B-3**	30.50
	2.15	2.60	3.04	3.49	**H2007B-3**	30.50
	3.23	3.90	4.56	5.23	**H2008B-3**	30.50
	4.55	5.50	6.45	7.40	**H2009B-3**	30.50
	6.75	8.17	9.58	11.0	**H2010B-3**	30.50
	9.14	10.8	12.4	14.0	**H2011B-3**	30.50
	14.0	16.9	19.9	22.8	**H2012B-3**	30.50
	18.7	22.7	26.7	30.7	**H2013B-3**	30.50
	23.5	28.5	33.5	38.5	**H2014B-3**	30.50
For Use with NEMA Size 2, IEC Sizes G – K Only — Series B						
75A	29.0	34.0	39.1	44.1	**H2015B-3**	30.50
	39.6	45.5	51.5	57.4	**H2016B-3**	30.50
	53.9	60.9	67.9	74.9	**H2017B-3**	30.50
For Use with NEMA Sizes 3 – 4, IEC Sizes L – N Only — Series A						
105A or 144A	8.0	9.2	10.3	11.5	**H2025-3**	30.50
	11.4	12.8	14.3	15.7	**H2026-3**	30.50
	14.3	15.7	17.4	19.0	**H2027-3**	30.50
	18.0	20.2	22.3	24.5	**H2018-3**	30.50
	24.6	27.6	30.5	33.4	**H2019-3**	30.50
	33.5	37.5	41.5	45.6	**H2020-3**	30.50
	45.7	51.2	56.7	62.1	**H2021-3**	30.50
	62.2	69.7	77.1	84.6	**H2022-3**	30.50
	84.7	95.0	105.0	115.0	**H2023-3**	30.50
	106.0	118.0	131.0	144.0	**H2024-3**	30.50
For Use with Size 5 Starters — Series B and IEC P, R and S with 300/5 CT						
32A ②	49	59	69	79	**H2004B-3**	30.50
	72	87	103	118	**H2005B-3**	30.50
	107	130	152	174	**H2006B-3**	30.50
	129	156	182	209	**H2007B-3**	30.50
	194	234	274	—	**H2008B-3**	30.50
For Use with Size 6 Starters Only — Series B and IEC T – V with 600/5 CT						
32A ②	144	174	205	235	**H2005B-3**	30.50
	215	259	304	348	**H2006B-3**	30.50
	258	312	365	419	**H2007B-3**	30.50
	388	468	547	627	**H2008B-3**	30.50
For Use with Size 7 Starters Only — Series B and IEC W – X with 1000/5 CT						
32A ②	163	197	230	264	**H2004B-3**	30.50
	240	290	342	392	**H2005B-3**	30.50
	358	432	506	580	**H2006B-3**	30.50
	430	520	608	698	**H2007B-3**	30.50
	646	780	912	—	**H2008B-3**	30.50
For Use with Size 8 Starters Only — Series B and IEC Z with 1500/5 CT						
32A ②	244	295	345	396	**H2004B-3**	30.50
	360	435	513	588	**H2005B-3**	30.50
	537	648	759	870	**H2006B-3**	30.50
	645	780	912	1047	**H2007B-3**	30.50
	969	1170	1368	—	**H2008B-3**	30.50

① Heater packs are shipped 3 to a carton. Catalog Numbers and prices are for 3 heater packs.

② Sizes 5 – 8 and IEC P – Z use the 32A overload relay with current transformers.

Table 33-75. Fast Trip — Class 10 Heater Selection

Overload Relay Size	Motor Full Load Ampere Rating — Dial Position A	B	C	D	Catalog Number (Includes 3 Heater Packs) ③	Price U.S. $
For Use with NEMA Sizes 00 – 0 Series C, NEMA Sizes 1 – 2 Series B; IEC Sizes A – F Series C, IEC Sizes G – K Series B						
32A or 75A	.260	.313	.367	.420	**H2101B-3**	30.50
	.384	.464	.543	.623	**H2102B-3**	30.50
	.570	.688	.806	.924	**H2103B-3**	30.50
	.846	1.02	1.20	1.37	**H2104B-3**	30.50
	1.28	1.55	1.83	2.10	**H2105B-3**	30.50
	1.92	2.33	2.74	3.15	**H2106B-3**	30.50
	2.30	2.79	3.28	3.77	**H2107B-3**	30.50
	3.38	4.10	4.82	5.54	**H2108B-3**	30.50
	4.96	6.03	7.09	8.16	**H2109B-3**	30.50
	7.07	8.58	10.1	11.6	**H2110B-3**	30.50
	9.60	11.2	12.8	14.4	**H2111B-3**	30.50
	14.4	17.5	20.7	23.8	**H2112B-3**	30.50
	18.7	21.8	25.0	28.1	**H2113B-3**	30.50
	23.5	27.3	31.0	34.8	**H2114B-3**	30.50
For Use with NEMA Size 2, IEC Sizes G – K Only — Series B						
75A	28.3	32.6	37.0	41.3	**H2115B-3**	30.50
	36.6	42.3	48.1	53.8	**H2116B-3**	30.50
	53.8	60.8	67.9	74.9	**H2117B-3**	30.50
For Use with Size 5 Starters Only — Series B and IEC P, R and S with 300/5 CT						
32A ④	51	61	72	82	**H2104B-3**	30.50
	77	93	110	126	**H2105B-3**	30.50
	115	140	164	189	**H2106B-3**	30.50
	138	167	197	226	**H2107B-3**	30.50
	203	246	289	—	**H2108B-3**	30.50
For Use with Size 6 Starters Only — Series B and IEC T – V with 600/5 CT						
32A ④	154	186	220	252	**H2105B-3**	30.50
	230	280	329	378	**H2106B-3**	30.50
	276	335	394	452	**H2107B-3**	30.50
	406	492	578	—	**H2108B-3**	30.50
For Use with Size 7 Starters Only — Series B and IEC W – X with 1000/5 CT						
32A ④	169	204	240	274	**H2104B-3**	30.50
	256	310	366	420	**H2105B-3**	30.50
	384	466	543	630	**H2106B-3**	30.50
	460	558	656	754	**H2107B-3**	30.50
	676	820	—	—	**H2108B-3**	30.50
For Use with Size 8 Starters Only — Series B and IEC Z with 1500/5 CT						
32A ④	254	306	360	411	**H2104B-3**	30.50
	384	465	549	630	**H2105B-3**	30.50
	576	699	822	945	**H2106B-3**	30.50
	690	837	984	1131	**H2107B-3**	30.50
	1014	1230	—	—	**H2108B-3**	30.50

③ Heater packs are shipped 3 to a carton. Catalog Numbers and prices are for 3 heater packs.

④ Sizes 5 – 8 and IEC P – Z use the 32A overload relay with current transformers.

Discount Symbol **1CD1C**

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Current Sensing Protective Relay

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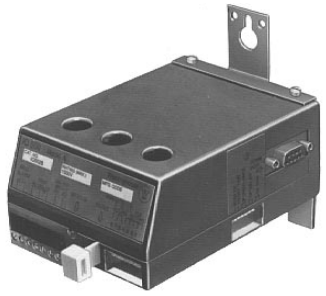


Catalog Number IQ502A

Product Description

The IQ500 is a heaterless, current-sensing, solid-state motor protective relay with optional communications capabilities. Several functions are incorporated into the base relay (IQ502/IQ504) as standard:

- Overload (overcurrent) protection
- Phase unbalance and phase loss protection
- Ground current protection (Class II)

The base relay can serve as the initial building block for a motor protection system by adding the IQ500M Special Function Module. The module can address application related motor load functions with the additional features:

- Underload protection
- Long acceleration
- Jam protection
- Load control

The IQ500 can provide a cost-effective alternative to conventional protective relays such as current relays, ground fault relays and phase loss or phase unbalance relays. Used with the PowerNet system, a low-cost, local area communication network, information such as current values, status, setpoint values and cause of trip can be displayed remotely. The IQ500 relay is ideal for a variety of industrial applications such as mining, timber, material handling, air conditioning compressors, wastewater treatment plants and petrochemical industries.

Features

- Overload class is adjustable using DIP switches for 5, 10, 20 or 30 seconds, maximum trip times at six times rated current
- Designed for 1000V and less distribution systems
- Form C (NO/NC) contact on output relay
- Isolated alarm relay output contact
- Communications capability using IMPACC network
- Manual or automatic reset (either a true manual or remote electrical reset) — selectable
- Overload, Class II ground current, phase unbalance and single-phase protection are standard
- LED indication (bi-colored — red/green) for device status, including overload, phase unbalance or ground current trip
- Special Function Module adds protection for underload and jam conditions, also provides for long acceleration
- Optional load control feature available with special function module
- Feed-through current transformer windows for contactors, NEMA Sizes 1 – 4 (for Size 5 and larger, external current transformers can be used)
- Fits mounting footprint of Cutler-Hammer MORA relay
- Panel or starter mountable
- Cause of trip is held in memory through a power loss
- Bell alarm contact available for remote status indication
- DIP switch provided for setting operating frequency — 50 or 60 Hz
- Plug-in terminal block for control power, trip relay and bell alarm relay connections
- Operating temperature: -20° to 60°C (-4° to 140°F)

Benefits

- No external current transformers are required since they are internal to the IQ500.
- DIP switches used to select functions and settings on base relay are clearly marked and covered with screw-on plastic covers.
- On the automatic reset, the reset times can be selected for long (90 second) or short (10 second) delay.
- Device can be set for different motor full load currents without additional parts or modules.

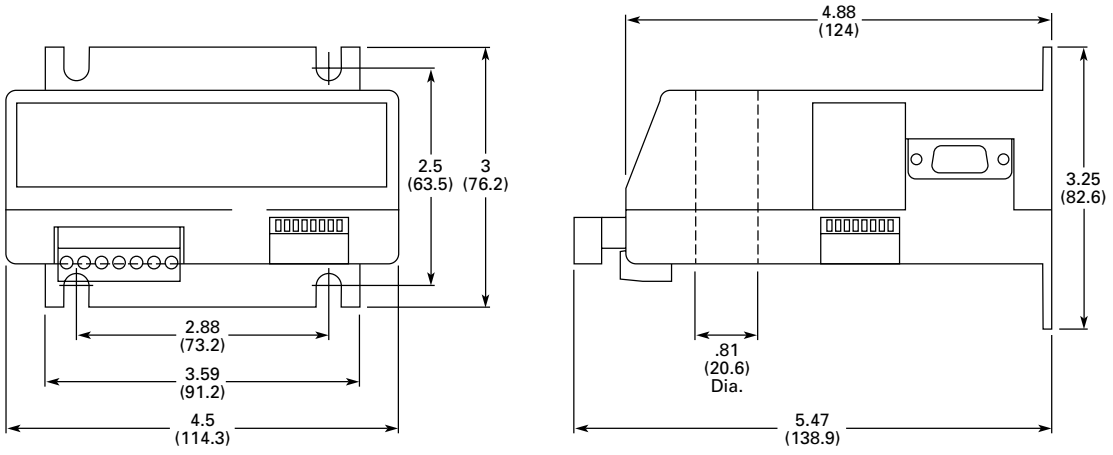
Optional Benefits

- With the addition of the IQ500M Special Function Module, the enhanced protection includes jam (overtorque) and underload and provides long acceleration time (high inertia load).
- The underload and jam protection functions each have independent Form C output relays as part of the module. In addition, the underload and jam functions each have their own LEDs for status indication.
- The underload and jam functions also have separate selectable trip levels and adjustable trip-delay and start-delay settings.
- The IQ500M can be used as a load control module that allows “shedding and restoring” a particular load that contributes to the load being monitored.
- The PONI (Product Operated Network Interface) card attaches directly to the base relay or special function module for interfacing with the Cutler-Hammer PowerNet communications system.
- Localized display can be achieved with the Central Monitoring Unit.

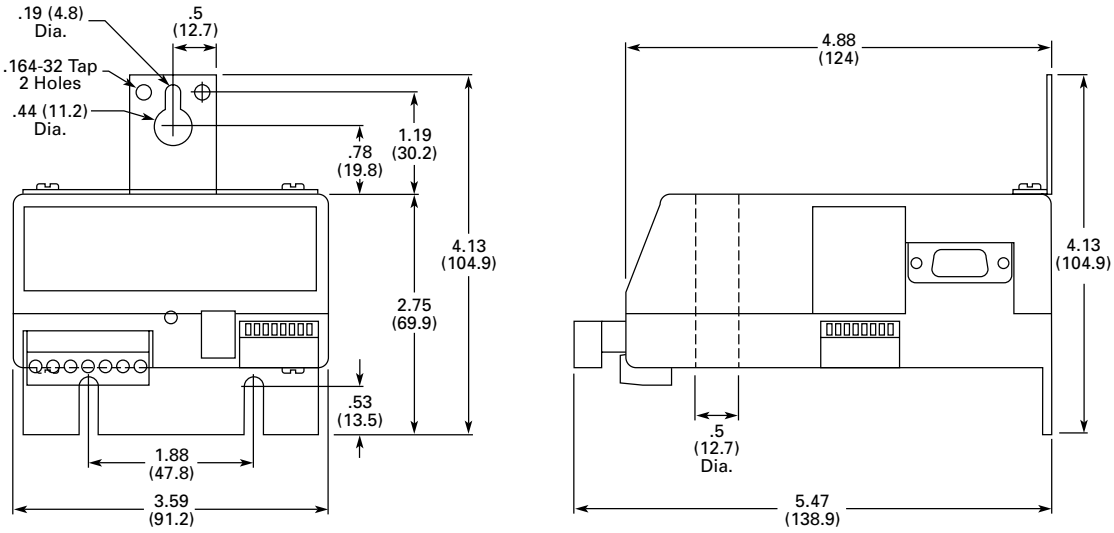
Standards and Certifications

- UL File No. E19223

Dimensions



IQ504



IQ500L and IQ502

Figure 33-21. Approximate Dimensions in Inches (mm)

Product Selection

Table 33-76. Current Sensing Protective Relay

Maximum Horsepower			Ampere Rating	Catalog Number		Price U.S. $
				Control Voltage		
200V	230V	460 – 475V		110/120V 50/60 Hz	220/240V 50/60 Hz	
20	25	50	3.4 to 66A	**IQ502A**	**IQ502B**	645.
60	75	150	10.8 to 207A	**IQ504A**	**IQ504B**	645.
—	—	—	.32 to 5.4A	**IQ500LA** ①	**IQ500LB** ①	645.
Special Function Module				**IQ500M**		391.

① Can be used with external CTs having 5A secondary.

Discount Symbol **1CD1C**

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Catalog Number ECN2208AAC

Product Description

The "Freedom Series" starters feature a compact, space-saving design, using state-of-the-art technology and the latest in high strength, impact and temperature resistant insulating materials. Starters are available in two rating/configuration styles — NEMA (National Electrical Manufacturers Association) and IEC (International Electrotechnical Commission). The NEMA devices are sized based on traditional NEMA classifications and the IEC devices on international ratings. Internationally rated starters, as compared to NEMA devices, generally are physically down-sized to provide higher ratings in a smaller package. However, electrical load/life ratings are correspondingly reduced. Careful consideration should be given to the selection of the proper device for a specific application. Parameters, such as type of load, severity of duty, electrical load/life cycles required, etc., must be evaluated before choosing either the IEC or NEMA designs. Since the IEC devices are typically smaller than the equivalent NEMA device, there is a cost advantage over the NEMA starters and contactors.

Features

- A single family of starters suitable for application in both the IEC and NEMA markets. "Two lines, One family" — the best of both worlds.
- Adjustable Bimetallic Ambient Compensated Overload Relays with interchangeable heater packs — available in three basic sizes, covering applications up to 900 hp — reducing the number of different contactor/overload relay combinations that have to be stocked. Fixed heater overloads optional.
- A full line of snap-on accessories common to both IEC and NEMA devices — top and side mounted auxiliary contacts, solid-state and pneumatic timers, etc.
- Straight-through wiring — line lugs at top, load lugs at bottom.
- Horizontal or vertical mounting on upright panel for application freedom.
- Screw type power terminals have captive, backed-out self-lifting pressure plates with ± screws — reduced wiring time.
- Accessible terminals for easy wiring. Optional fingerproof shields available to prevent electrical shock.
- Top located coil terminals convenient and readily accessible. 45 mm contactor magnet coils have three terminals, permitting either top or diagonal wiring — easy to replace European or U.S. style starters or contactors without changing wiring layout.
- Encapsulated dual voltage/frequency magnet coils — permanently marked with voltage, frequency and part number. IEC sizes A – F have non-encapsulated coils as standard, encapsulated as optional.
- Designed to meet or exceed NEMA, UL, CSA, IEC, VDE, BS and other international standards and listings.
- American engineering and manufacturing — built in the U.S.A. by Eaton Corp./Cutler-Hammer, using the latest in statistical process control methods to produce high quality, reliable products.

Standards and Certifications

Certified Type 2 Coordination

Cutler-Hammer Freedom Series IEC starters and NEMA starters are UL Certified to achieve IEC 947 Type 2 coordination against 100,000A short circuit fault currents. Any brand of properly selected fuse can be used. Type 2 coordination means that the starter will be suitable for further use following a short circuit fault.

ISO 9001 Certification

When you turn to Cutler-Hammer Products, you turn to quality. The International Standards Organization (ISO) has established a series of standards acknowledged by 91 industrialized nations to bring harmony to the international quest for quality. The ISO certification process covers 20 quality system elements in design, production and installation that must conform to achieve registration. The Enclosed Control is manufactured in our Fayetteville, NC plant, and this facility is registered ISO 9001. This commitment to quality results in increased product reliability and total customer satisfaction.

Freedom NEMA starters are designed to NEMA standards and are extremely rugged products built for any application. Their long electrical/mechanical life is extended through easy maintainability.

- Meets and exceeds all NEMA, UL and CSA standards.
- Sized based on standard NEMA classifications.
- Designed and built for a variety of demanding applications.
- Easy coil change and inspectable/replaceable contacts.
- Adjustable/interchangeable heater packs for flexibility.
- Available Open and in NEMA 1, 3R, 4/4X, 7/9 and 12 enclosures.

Short Circuit Protection

Fuses and **Inverse-Time Circuit Breakers** may be selected per Article 430, Part D of the National Electrical Code to protect motor branch circuits from fault conditions. If higher ratings or settings are required to start the motor, do **not** exceed the maximum as listed in Exception No. 2, Article 430-52.

Modification Codes

Table 33-77. A — Ammeters, Auxiliary Contacts, Accelerating Relays, ACM Cover Control Modifications

Modification	Catalog Number Suffix	Description	Adder U.S. $
Ammeter ①	**A1**	Panel Type Wired to Current Transformer in Line 1, NEMA 1, 12	945.
		Panel Type Wired to Current Transformer in Line 1, NEMA 3R, 4X	1,525.
	A2	Panel Type, Selector Switch and 3 Current Transformers Wired to Ammeter via Switch, NEMA 1, 12	2,475.
		Panel Type, Selector Switch and 3 Current Transformers Wired to Ammeter via Switch, NEMA 3R, 4X	3,115.
	A3	Miniature (Single-Phase), NEMA 1, 12	675.
	A4	Miniature with Selector Switch, NEMA 1, 12	1,080.
	A5	Switchboard (Single-Phase), NEMA 1, 12	1,325.
		Switchboard (Single-Phase), NEMA 3R, 4X	1,820.
	A6	Switchboard with Selector Switch. NEMA 1, 12	1,725.
		Switchboard with Selector Switch. NEMA 3R, 4X	2,250.
	A7	3-Panel Type (Single-Phase), NEMA 1, 12	2,805.
		3-Panel Type (Single-Phase), NEMA 3R, 4X	3,325.
	A10	3 Miniature (Single-Phase), NEMA 1, 3R, 4X, 12	2,010.
	A11	3 Switchboard Type (Single-Phase). NEMA 1, 12	3,970.
		3 Switchboard Type (Single-Phase). NEMA 3R, 4X	4,515.
	A12	Ammeter Order by Description, NEMA 1, 3R, 4X, 12	②
Top Mounted Auxiliary Contacts ③ ④ (Unwired) NEMA Sizes 00 – 2 only (Unwired) IEC Sizes A – K Only (Unwired) Freedom Series	**A13**	1NO	75.
	A14	1NC	75.
	A15	1NO-1NC	149.
	A16	2NO	149.
	A17	2NC	149.
	A18	2NO-1NC	222.
	A19	1NO-2NC	222.
	A20	3NO	222.
	A21	3NC	222.
	A22	3NO-1NC	295.
	A23	2NO-2NC	295.
	A24	1NO-3NC	295.
	A25	4NO	295.
	A26	4NC	295.

Table 33-77. A — Ammeters, Auxiliary Contacts, Accelerating Relays, ACM Cover Control Modifications (Continued)

Modification	Catalog Number Suffix	Description	Adder U.S. $
Side Mounted Auxiliary Contacts Freedom Series (Advantage — use Mod Codes A36 – A40)	**A27**	1NO	75.
	A28	1NC	75.
	A29	1NO-1NC	149.
	A30	2NO	149.
	A31	2NC	149.
	A32	2NO-1NC	222.
	A33	1NO-2NC	222.
	A34	3NO	222.
	A35	3NC	222.
	A36	3NO-1NC	295.
	A37	2NO-2NC	295.
	A38	1NO-3NC	295.
	A39	4NO	295.
	A40	4NC	295.
Auxiliary Contacts ④	**A42**	Contacts Mounted on Operating Mechanism of Disconnect Switch, 1NO-1NC	101.
	A43	Contacts Mounted on Operating Mechanism of Disconnect Switch, 2NO-2NC	149.
	A44	With Auxiliary Contact Omitted	—
	A45	With 1 Set of Auxiliary Contacts (1NO-1NC) Plus 2 Tie Points, Unwired per Contactor (Advantage)	149.
Accelerating Relay	**A46**	For 2-Speed	1,030.
	A47	2NO/2NC 24V DC Auxiliary Relay — IT Only	360.
Advantage Control Module ⑤ (ACM)	**A49**	Full Voltage Status Only with RESET	287.
	A50	Full Voltage START/STOP	346.
	A51	Full Voltage START/STOP/HOA	394.
	A52	Full Voltage ON/OFF/AUTO	333.
	A53	Reversing Status Only with RESET	370.
	A54	Reversing FORWARD/REVERSE/STOP	459.
	A55	Reversing FORWARD/REVERSE/ STOP/HOA	510.
	A56	2-Speed Status Only with RESET	370.
	A57	2-Speed FAST/SLOW/STOP	459.
	A58	2-Speed FAST/SLOW/STOP/HOA	510.
	A59	Reduced Voltage Status Only with RESET	328.
	A60	Reduced Voltage START/STOP	367.
	A61	Reduced Voltage START/STOP/HOA	434.
	A62	Reduced Voltage ON/OFF/AUTO	374.
	A63	Metering Module	469.
	A64	ACM — Order by Description	②

① Oversize enclosure will be provided for IT Starters.
② Consult factory for price.
③ Top mounted auxiliary contacts cannot be added to contactors in Box 1 (NEMA 1).
④ Not available for IT Starters.
⑤ NEMA 1/12 only.

Discount Symbol **1CD-1C**

Modification Codes (Continued)

Table 33-78. B — Breaker Modifications, Backspin Timer, Undervoltage Release, Bell Alarm, Bus Choke

Modification	Catalog Number Suffix	Description	Adder U.S. $
Breaker	**B1**	1NO-1NC Auxiliary Contact on Breaker	101.
	B2	2NO-2NC Auxiliary Contacts on Breaker	149.
	B3	Shunt Trip on Circuit Breaker — 48 – 127V AC or DC	269.
	B4	Shunt Trip on Circuit Breaker — 9 – 24V AC or DC	269.
	B5	Shunt Trip on Circuit Breaker — 280 – 380V AC	269.
	B6	Shunt Trip on Circuit Breaker — 415 – 600V AC or 220 – 250V DC	269.
	B8	Undervoltage Release for Breaker	269.
	B9	Current Limiter Mounted to Breaker	269.
	B10	Breaker — Order by Description	①
Backspin Timer	**B12**	180 Seconds	525.
Undervoltage Release	**B13**	Undervoltage Release for Circuit Breaker — 208 – 240V AC	269.
	B14	Undervoltage Release for Circuit Breaker — 380 – 480V AC	269.
	B15	Undervoltage Release for Circuit Breaker — 525 – 600V AC	269.
Bell Alarm	**B16**	Bell Alarm for Circuit Breaker	269.
Bus Choke (AF91)	**B20**	DC Bus Choke, Open Core and Coil ②	

240V	1/4 hp	1/2 hp	1 hp	2 hp	3 hp	5 hp
U.S. $	65.	70.	107.	113.	129.	134.
480V	—	1/2 hp	1 hp	2 hp	3 hp	5 hp
U.S. $	—	70.	97.	129.	129.	134.

① Consult factory for price.

② A DC bus choke may be used in place of an AC line reactor for line harmonic current reduction and for power source exceeding 500 kVA. The DC bus choke will not provide any protection for line voltage unbalance or transients.

Table 33-79. C — Control Power Transformer, Control Relays, Cover Control (not elsewhere defined), Current Transformers, Compelling Relay, Control Wiring, Control Circuit Breaker, Separate Control, Customer-Supplied Components, Contactors, Counter, E-Stop Relay, DC/AC Interface, Separate Source Disconnect, Bypass Contactors

Modification	Catalog Number Suffix	Description	Adder U.S. $
Control Power Transformers Make sure 8th character specifies primary/ secondary voltage. See **Page 33-52**.	**C1**	Standard Size Control Transformer, 120V/60 Hz, 110V/50 Hz Secondary with 2 Primary and 1 Secondary Fuse	

00 – 1 A – H	2 J – K	3 L – M	4 N	5 P – S	6 – 9 —
182.	255.	375.	455.	515.	660.

C2	Standard Size Control Transformer, 24V/60 Hz Secondary with 2 Primary and 1 Secondary Fuse	

00 – 1 A – H	2 J – K	3 L – M	4 N	5 P – S	6 – 9 —
169.	238.	351.	426.	482.	614.

Table 33-79. C — Control Power Transformer, Control Relays, Cover Control (not elsewhere defined), Current Transformers, Compelling Relay, Control Wiring, Control Circuit Breaker, Separate Control, Customer-Supplied Components, Contactors, Counter, E-Stop Relay, DC/AC Interface, Separate Source Disconnect, Bypass Contactors (Continued)

Modification	Catalog Number Suffix	Description	Adder U.S. $
Control Power Transformers Make sure 8th character specifies primary/ secondary voltage. See **Page 33-52**.	**C42**	50 VA Extra Capacity CPT 120V/60 Hz, 110V/50 Hz with 2 Primary and 1 Secondary	

00 – 1 A – H	2 J – K	3 L – M	4 N	5 P – S	6 – 9 —
273.	427.	481.	560.	560.	660.

C3	100 VA Extra Capacity CPT, 120V/60 Hz, 110V/50 Hz Secondary with 2 Primary and 1 Secondary Fuse	

00 – 1 A – H	2 J – K	3 L – M	4 N	5 P – S	6 – 9 —
322.	525.	600.	660.	660.	660.

C4	100 VA Extra Capacity CPT, 24V/60 Hz Secondary with 2 Primary and 1 Secondary Fuse	

00 – 1 A – H	2 J – K	3 L – M	4 N	5 P – S	6 – 9 —
322.	525.	600.	660.	660.	660.

C5	200 VA Extra Capacity CPT, 120V/60 Hz, 110V/50 Hz Secondary with 2 Primary and 1 Secondary Fuse	

00 – 1 A – H	2 J – K	3 L – M	4 N	5 P – S	6 – 9 —
435.	550.	655.	720.	720.	720.

C6	200 VA Extra Capacity CPT, 24V/60 Hz Secondary with 2 Primary and 1 Secondary Fuse	

00 – 1 A – H	2 J – K	3 L – M	4 N	5 P – S	6 – 9 —
435.	550.	655.	720.	720.	720.

C7	300 VA Extra Capacity CPT, 120V/60 Hz, 110V/50 Hz Secondary with 2 Primary and 1 Secondary Fuse	

00 – 1 A – H	2 J – K	3 L – M	4 N	5 P – S	6 – 9 —
565.	675.	785.	845.	845.	920.

C8	400 VA Extra Capacity CPT, 120V/60 Hz, 110V/50 Hz Secondary with 2 Primary and 1 Secondary Fuse	

00 – 1 A – H	2 J – K	3 L – M	4 N	5 P – S	6 – 9 —
785.	930.	1,030.	1,165.	1,165.	1,165.

C9	1 kVA Extra Capacity CPT, 120V/60 Hz, 110V/50 Hz Secondary with 2 Primary and 1 Secondary Fuse	1,120.
C10	2 kVA Extra Capacity CPT, 120V/60 Hz, 110V/50 Hz Secondary with 2 Primary and 1 Secondary Fuse	1,675.
C11	Control Transformer — Order by Description	③
C34	CPT with Power Supply for IT	399.
Control Relays	**C12**	4-Pole Interposing Relay, 600V (2NO/2NC)	710.
	C13	Run Relay, 24V DC (AF91)	535.

③ Consult factory for price.

Discount Symbol **1CD-1C**

Modification Codes (Continued)

Table 33-79. C — Control Power Transformer, Control Relays, Cover Control (not elsewhere defined), Current Transformers, Compelling Relay, Control Wiring, Control Circuit Breaker, Separate Control, Customer-Supplied Components, Contactors, Counter, E-Stop Relay, DC/AC Interface, Separate Source Disconnect, Bypass Contactors (Continued)

Modification	Catalog Number Suffix	Description	Adder U.S. $
Control Relays (Continued)	C14 ①	4-Pole, Unwired, A600 Rtg. — 2NO-2NC	610.
	C15 ①	8-Pole, Unwired, A600 Rtg. — 4NO-4NC	675.
	C16	Control Relay — Order by Description	②
	C20 ①	2-Wire Control Relay for Magnetic Lighting Contactors	224.
Cover Control	C17 ①	Convert Position 9 to E30 Type Cover Control	59.
	C19 ①	Lock-Off Attachment Added on Cover Control	②
Current Transformer(s)	C21	In Phase 1	469.
	C22	In Phases 1 and 2	945.
	C23	In 3 Phases	1,405.
Compelling Relay	C25 ①	—	442.
Control Wiring	C26	Omit Control Wiring	N/C
	C27	Separate Control 120V — 24V IT Only	N/C
	C30 ①	With Separate Control Wiring and Two 250V Fuses in Holder	149.
	C31 ①	With Common Control Wiring and Two 600V (Class CC) Fuses in Holder	149.
	C33	Control Wiring Type — Order by Description	②
Control Circuit Breaker	C32 ①	Order by Description	②
Separate Control	C35	Wired for Separate Control (Reduced Voltage)	N/C
Customer Supplied Components	C36	Customer Supplied Components to Be Installed	②
	C37	Customer Supplied Wiring Diagram to Use	②
Contactor/ Starter	C40 ①	Contactor/Starter — Order by Description	②
Counter	C41 ①	Operations Counter	675.
E-Stop Relay	C43 ①	E-Stop Relay (DeviceNet)	246.
DC/AC Interface	C44 ①	DC/AC Interface Module	②
Separate Source Disconnect	C45 ①	IEC Separate Source Disconnect for Control Circuitry	②
Bypass Contactors for IT/AF91 Starters (AF91: 1/4 to 5 hp Only)	C46/J1	Isolation Contactor	
		AF91 37A 66A 105 – 135A	
		193. 430. 1,270. 1,915.	
		180 – 240A 304 – 500A 650 – 720A 850A	
		2,745. 9,010. 9,890. 19,550.	
	C46/J2	Output Contactor	
		AF91 37A 66A 105 – 135A	
		193. 430. 1,270. 1,915.	
		180 – 240A 304 – 500A 650 – 720A 850A	
		2,745. 9,010. 9,890. 19,550.	
	C46/J3	Bypass Contactor	
		AF91 37A 66A 105 – 135A	
		193. 430. 1,270. 1,915.	
		180 – 240A 304 – 500A 650 – 720A 850A	
		2,745. 9,010. 9,890. 19,550.	

① Not available for IT Starters.
② Consult factory for price.

Table 33-79. C — Control Power Transformer, Control Relays, Cover Control (not elsewhere defined), Current Transformers, Compelling Relay, Control Wiring, Control Circuit Breaker, Separate Control, Customer-Supplied Components, Contactors, Counter, E-Stop Relay, DC/AC Interface, Separate Source Disconnect, Bypass Contactors (Continued)

Modification	Catalog Number Suffix	Description	Adder U.S. $
Bypass Contactors for IT/AF91 Starters (AF91: 1/4 to 5 hp Only) (Continued)	C46/J4	Isolation/Output/Bypass Contactor	
		AF91 37A 66A 105 – 135A	
		645. 1,340. 3,950. 5,850.	
		180 – 240A 304 – 500A 650 – 720A 850A	
		8,400. 27,240. 30,040. 59,130.	
	C46/J5	3-Contactor Bypass Pkg. for AF91 ③	2,150.

③ Includes CPT, Pilot Lights, Selector Switch, Auxiliary Contacts and Control Relay.

Table 33-80. D — Device Labels, Deceleration Relay, Drain and Breather, Duplex Modifications

Modification	Catalog Number Suffix	Description	Adder U.S. $
Device Labels	D1	(each label)	35.
Decel. Relay ④	D2	2-Speed	1,030.
Drain and Breather (NEMA 7/9 Enclosure) ④	D5	Drain and Breather	374.
	D6	Drain Only	214.
	D7	Breather Only	214.
Duplex Modifications	D12	Alternator Omitted (Deduct Price)	-360.
	D14	START/STOP Pushbuttons — Supplied for Each Motor	195.
	D15	HAND/OFF/AUTO Selector Switch — Supplied for Each Motor	195.
	D16	No. 1 Lead - No. 2 Lead Selector Switch for Manual Selection of Lead Pump (Alternator is Omitted)	242.
	D17	Red RUN Pilot Light — Supplied for Each Motor	315.
	D18	Push-to-Test Red RUN Pilot LIght — Supplied for Each Motor	408.
	D19	TEST Pushbutton for Each Motor	315.
	D20	CPT, 120V Secondary, 2 Pri. Fuses & 1 Sec. Fuse — Supplied for Ea. Motor	
		00 – 1 2 3 4 – 9	
		362. 510. 760. 920.	
	D21	CPT w/100VA Extra Capacity, 120V Sec., 2 Pri. Fuses & 1 Sec. Fuse — Supplied for Ea. Motor	
		00 – 1 2 3 4 – 9	
		615. 835. 1,050. 1,180.	
	D22	CPT w/200VA Extra Capacity, 120V Sec., 2 Pri. Fuses & 1 Sec. Fuse — Supplied for Ea. Motor	
		00 – 1 2 3 4 – 9	
		870. 1,090. 1,300. 1,435.	
	D23	CPT for Duplex — Order by Descrip.	⑤
	D24	Add 2 Relays to Modify Controller to Operate w/ Single-Pole Pilot Devices	685.
	D25	Add 3 Relays to Modify Controller to Operate w/ Single-Pole Pilot Devices	1,025.
	D26	Green — OFF for each starter	315.
	D27	Green — Push-to-Test OFF for ea. starter	408.

④ Not available for IT Starters.
⑤ Consult factory for price.

Discount Symbol **1CD-1C**

Modification Codes (Continued)

Table 33-81. E — Enclosure Modifications, Elapsed Time Meter, Duplex Outlet, Starter

Modification	Catalog Number Suffix	Description	Adder U.S. $
Enclosure Modifications	E3	Oversize Enclosure	168.
	E4	Enclosure — Order by Description	②
	E8	Service Entrance Rating	535.
	E11	Safety Door Interlock	107.
Elapsed Time Meter	E9	Wired Across Coil, NEMA 1, 12	388.
		Wired Across Coil, NEMA 3R, 4X	660.
	E10	Elapsed Time Meter — Order by Description	②
Duplex Outlet	E12	Convenience Duplex Outlet Mounted in Side of Enclosure	135.
Starter ①	E13	Horizontal Combination Starter	81.
	E14	Narrow Combination Starter	81.

① Not available for IT Starters.
② Consult factory for price.

Table 33-82. F — Fuse Clips, Fuse Blocks, Fungus Protection, Fingerproof Covers, EMI Filter

Modification	Catalog Number Suffix	Description	Adder U.S. $
Fuse Clips	F1	Change Fuse Clips in Position 10 to Class J	
		00 – 1 A – H / **2 J – K** / **3 L – M** / **4 N** / **5 –6 P – S**: 21. / 35. / 82. / 135. / 189.	
	F2	Change Fuse Clips in Position 10 to Class H & K (30 & 60 Ampere Only)	N/C
Fuse Blocks	F4	Power Fuses Included — Order by Description	④
	F5	30 Ampere Control Circuit Fuseholder (KTK) Mounted on Panel (Unwired), Fuse Not Supplied	149.
	F6	30 Ampere Control Circuit Fuseholder Mounted on Panel (Unwired), FNQR Fuse Supplied	185.
	F7	3-Pole Power Fuseholder Mounted on Front Contactor	161.
	F8	Separate Fusing of Control Power Supply — IT	140.
	F10	Blown Fuse Indicator (Not for PFC)	193.
	F21	Class CC Fuses	④
EMI Filter (AF91)	F22	3-Phase ③	
		240V 1/4 hp / 1/2 hp / 1 hp / 2 hp / 3 hp / 5 hp	
		U.S. $ 145. / 145. / 188. / 214. / 214. / 289.	
		480V 1/4 hp / — / 1 hp / 2 hp / 3 hp / 5 hp	
		U.S. $ 188. / — / 188. / 188. / 214. / 214.	
	F23	1-Phase ③	
		240V 1/4 hp / 1/2 hp / 1 hp / 2 hp / 3 hp	
		U.S. $ 81. / 81. / 92. / 118. / 118.	

③ The EMI filter is not necessary to meet the CE mark requirements for EMC when installing the AF91 in an EC country.
④ Consult factory for price.

Table 33-83. G — Ground Fault Relay, Grounding

Modification	Catalog Number Suffix	Description	Adder U.S. $
Ground Fault Relay	G1	Ground Fault Relay (Wired)	2,510.
	G3	Ground Fault Relay (Unwired)	1,120.
Grounding	G5	Special Grounding — Order by Description	⑤
	G6	Ground Fault Protection Omitted (Advantage)	N/C
	G7	Ground Fault Protection & Monitoring Panel	3,710.

⑤ Consult factory for price.

Table 33-84. H — Heater (Space), Heater Packs Installed

Modification	Catalog Number Suffix	Description	Adder U.S. $
Space Heater	H1	Space Heater and Thermostat	
		00 – 1 A – H 37A / **2 J – K 66 – 105A AF91** / **3 L – M 135A**	
		685. / 825. / 1,020.	
		4 N 180A / **5 P – S 240 – 304A** / **6 – 9 — 360 – 850A**	
		1,340. / 1,735. / 2,380.	
	H2	Space Heater and NC Interlock	
		00 – 1 A – H 37A / **2 J – K 66 – 105A AF91** / **3 L – M 135A**	
		241. / 427. / 690.	
		4 N 180A / **5 P – S 240 – 304A** / **6 – 9 — 360 – 850A**	
		1,100. / 1,645. / 2,495.	
Install Heater Packs (Freedom Series)	H5	**Class 20** / **Class 10**	49.
		/D1 H2001B-3, /D2 H2002B-3, /D3 H2003B-3, /D4 H2004B-3, /D5 H2005B-3 / /D25 H2101B-3, /D26 H2102B-3, /D27 H2103B-3, /D28 H2104B-3, /D29 H2105B-3	
		/D6 H2006B-3, /D7 H2007B-3, /D8 H2008B-3, /D9 H2009B-3, /D10 H2010B-3 / /D30 H2106B-3, /D31 H2107B-3, /D32 H2108B-3, /D33 H2109B-3, /D34 H2110B-3	
		/D11 H2011B-3, /D12 H2012B-3, /D13 H2013B-3, /D14 H2014B-3, /D15 H2015B-3 / /D35 H2111B-3, /D36 H2112B-3, /D37 H2113B-3, /D38 H2114B-3, /D39 H2115-3	
		/D16 H2016B-3, /D17 H2017B-3, /D18 H2018-3, /D19 H2019-3, /D20 H2020-3 / /D40 H2116-3, /D41 H2117-3	
		/D21 H2021-3, /D22 H2022-3, /D23 H2023-3, /D24 H2024-3	

Discount Symbol **1CD-1C**

Modification Codes (Continued)

Table 33-85. K — AF91 Keypad

Modification	Catalog Number Suffix	Description	Adder U.S. $
Remote Operating Keypads	**K1**	Remote Operating Station Display	134.
	K2	Remote Operating Station Enhanced Keypad	465.
	K3	Remote Operating Station Keypad and Copy Unit	960.

Table 33-86. L — Lightning Arrestor, Lugs, Labels, Line and Load Reactor

Modification	Catalog Number Suffix	Description	Adder U.S. $
Lighting Arrestor	**L3**	Installed on Panel	269.
Lugs	**L9**	Special Lugs — Order by Description	①
Carton Label	**L10**	Customer Marking — Specify	①
Line Reactors (AF91)	**L12**	3% Input Line Reactor, 3-Phase, Open Core and Coil ②	
		240V 1/4 hp 1/2 hp 1 hp 2 hp 3 hp 5 hp	
		U.S. $ 198. 171. 198. 209. 246. 320.	
		480V 1/4 hp 1/2 hp 1 hp 2 hp 3 hp 5 hp	
		U.S. $ — 203. 248. 203. 203. 235.	
	L13	3% Input Line Reactor, 1-Phase, Open Core and Coil ②	
		480V 1/4 hp 1/2 hp 1 hp 2 hp 3 hp 5 hp	
		U.S. $ 198. 209. 246. 320. 337. —	
	L14	5% Input Line Reactor, 3-Phase, Open Core and Coil ②	
		240V 1/4 hp 1/2 hp 1 hp 2 hp 3 hp 5 hp	
		U.S. $ 198. 198. 203. 235. 262. 332.	
		480V 1/4 hp 1/2 hp 1 hp 2 hp 3 hp 5 hp	
		U.S. $ 198. 198. 214. 214. 320.	
	L15	5% Input Line Reactor, 1-Phase, Open Core and Coil ②	
		480V 1/4 hp 1/2 hp 1 hp 2 hp 3 hp 5 hp	
		U.S. $ 198. 198. 198. 198. 246. —	
	L16	Line Reactor — Order by Description	①
Load Reactors (AF91)	**L17**	Output Line DV/DT Filter, Open Core and Coil ③	
		480V 1/4 hp 1/2 hp 1 hp 2 hp 3 hp 5 hp	
		U.S. $ — 203. 203. 203. 203. 235.	
	L18	Load Reactor — Order by Description	①

① Consult factory for price.
② If the power source exceeds 500 kVA, 3% line unbalance, or if transient voltages from power factor capacitor switching events are present, an input line reactor must be used. The input line reactor will also reduce line current harmonics.
③ The output line DV/DT filter is required when the distance from the drive to the motor exceeds 33 feet (10m). The total cable run should not exceed 165 feet (50m).

Table 33-87. N — Nameplates

Modification	Catalog Number Suffix	Description	Adder U.S. $
Nameplates	**N1**	Enclosure Nameplates	21.

Table 33-88. P — Pilot Lights, Pushbuttons, Phase Relays, Potential Transformers, Program Timer, Percentage Timer, Photocell

Modification	Catalog Number Suffix	Description	Adder U.S. $
Push-to-Test Pilot Lights	**P1**	Push-to-Test Pilot Light (Red RUN) Wired to Coil	201.
	P2	Push-to-Test Pilot Light (Green OFF) Wired in Series with Auxiliary Contact	281.
	P3	Combination of **P1** and **P2** Above	482.
	P4	Push-to-Test Pilot Light (Amber RUN) Wired to Coil	201.
	P49	Push-to-Test Pilot Light (Green RUN)	201.
	P54 ④	Push-to-Test Pilot Light — Red BYPASS (AF91)	201.
	P55 ④	Push-to-Test Pilot Light — Amber INVERTER ENABLE (AF91)	201.
	P56 ④	Push-to-Test Pilot Light — Red INVERTER RUNNING (AF91)	201.
	P57	Push-to-Test Pilot Light — Green STOP	281.
Pushbuttons	**P5**	EMERGENCY STOP — Mushroom Head	269.
	P6 ④	Pushbutton Omitted	N/C
	P7	START/STOP	159.
	P8	ON/OFF	159.
	P9	START	159.
	P10	ON	159.
	P11	OFF	159.
	P12 ④	FORWARD/REVERSE/STOP	269.
	P13 ④	FAST/SLOW/STOP	269.
	P14 ④	FAST/OFF/SLOW	269.
	P15 ④	HIGH/LOW/STOP	269.
	P16 ④	HIGH/LOW	269.
	P17 ④	SLOW/FAST	269.
	P18 ④	Pushbutton with Legend Plate	⑤
	P52	UP/STOP/DOWN	269.
	P53	OPEN/STOP/CLOSE	269.
Pilot Lights	**P19**	With 1 Amber Pilot Light Marked POWER AVAILABLE Wired to Load Side of 2 Fuses or Circuit Breaker	263.
	P20	Pilot Light (Amber RUN) Wired to Coil	159.
	P21 ④	With 1 Red Pilot Light Marked RUN Wired thru NO Auxiliary Contact	159.
	P22 ④	With 1 Push-to-Test Red Light Marked RUN Wired thru NO Auxiliary Contact	201.
	P23	Pilot Light — Red RUN	159.
	P24	Pilot Light — Red ON	159.
	P25	Pilot Light — Green OFF	159.
	P26	Pilot Light — Order by Description	⑤
	P29	Pilot Light — Red STOP	159.

④ Not available for IT Starters.
⑤ Consult factory for price.

Discount Symbol **1CD-1C**

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Modification Codes (Continued)

Table 33-88. P — Pilot Lights, Pushbuttons, Phase Relays, Potential Transformers, Program Timer, Percentage Timer, Photocell (Continued)

Modification	Catalog Number Suffix	Description	Adder U.S. $
Pilot Lights (Continued)	**P58**	Pilot Light — Red BYPASS (AF91)	159.
	P59 ①	Pilot Light — Amber INVERTER ENABLE (AF91)	159.
	P60 ①	Pilot Light — Red INVERTER RUNNING (AF91)	159.
	P61	Pilot Light — Green STOP	159.
	P62 ①	FORWARD/REVERSE Red Pilot Lights	315.
	P63 ①	UP/DOWN Red Pilot Lights	315.
	P64 ①	OPEN/CLOSE Red Pilot Lights	315.
	P65 ①	HIGH/LOW Red Pilot Lights	315.
	P66 ①	FAST/SLOW Red Pilot Lights	315.
	P67	Green RUN Light	159.
	P68	LED Bulbs (per light)	31.
	P69	Blue OVERLOAD Light (AF91)	159.
Illuminated Pushbutton	**P27**	Illuminated Pushbutton — Order by Description	②
Phase Loss Relay	**P28**	Phase Loss Relay	530.
Phase Reversal Relay	**P30**	Phase Reversal Relay	530.
Phase Unbalance Relay	**P32**	Phase Unbalance Relay	650.
Phase Monitoring Relay	**P34**	Phase Monitoring Relay	1,110.
Phase Loss	**P36** ①	Phase Loss Protection Omitted (Advantage)	N/C
	P37 ①	Modification to Extend Phase Loss Trip Time to 17 Seconds (Advantage)	N/C
Potential Transformers	**P39** ①	Potential Transformer — Wired L1 – L2	118.
	P40 ①	Potential Transformer — Wired L1– L2 and L2 – L3	235.
	P41 ①	Potential Transformer — 3 Phases	351.
Pump Controller	**P42**	Pump Controller for IT	1,005.
Program Timers	**P43**	15-Minute Program Timer	530.
	P44	24-Hour Program Timer	530.
	P45	7-Day Program Timer with Day Omission Feature	700.
Percentage Timers	**P47**	15-Minute Percentage Timer	530.
	P48	60-Minute Percentage Timer	530.
Photocell	**P70** ①	Photoelectric Receptacle with Photocell	406.

① Not available for IT Starters.
② Consult factory for price.

Table 33-89. Q — IQ Products, WPoni, DN50

Modification	Catalog Number Suffix	Description	Adder U.S. $
IQ Products	**Q14**	IQ 220 with cable	1,515.
	Q1	IQ 500	760.
	Q3	MP3000	5,010.
	Q5	IQ 4000	5,360.
IQ Data Metering Module	**Q12** ③	With IQ Data Metering Module	1,120.
WPoni	**Q8** ③	WPoni (Advantage)	445.
	Q9 ③	WCTLponi (Advantage)	525.
DN50	**Q13** ③	DeviceNet Input/Output Module	1,500.

③ Not available for IT Starters.

Table 33-90. R — Relays, Resets, Overload Relay Modifications, DeviceNet Modifications

Modification	Catalog Number Suffix	Description	Adder U.S. $
Ramp	**R1**	Extended Ramp of IT	580.
Relay ④	**R2**	Overvoltage Relay	423.
	R4	Omit Overload Relay (Deduct Price)	
		00 – 0 A – F / **1 G – H** / **2 J – K** / **3 L – M** / **4 N** / **5 – 9 P – S**	
		-30. / -30. / -54. / -90. / -138. / -504.	
	R7	Overload Relay — Order by Description	⑤
Resets ④	**R5**	Change External Reset to Internal Reset — Hole Covered with Plug	N/C
	R6	Internal Reset — No Hole Plug	N/C
	R44	Manual Reset Only on Overload Relay	6.
	R45	Auto Reset Only on Overload Relay	6.
	R47	With Internal Trip Indicator (No External Reset) — Advantage	21.
	R48	External Reset with External Trip Indicator (Advantage)	97.
	R49	With Alarm Module (Advantage) (Bell Alarm)	151.
	R71	N3R Reset Boot Added (NEMA 1/12 Only)	33.
Reversing ④	**R54**	Reversing Contactor/Starter	⑤
DeviceNet Modification	**R68**	WPONIDNA — DeviceNet Communication Interface	915.
	R69	DeviceNet Interface	⑤

④ Not available for IT Starters.
⑤ Consult factory for price.

Discount Symbol **1CD-1C**

Modification Codes (Continued)

Table 33-91. S — System Voltage, Selector Switches, Suppressor, Incomplete Sequence Protection, Single-Phase Jumper, Surge Capacitor, Speed Potentiometer

Modification	Catalog Number Suffix	Description	Adder U.S. $
System Voltage Selection	**S1**	System Voltage Selection for Internal Components	N/C
		/H1 208V 60 Hz /H2 240V 60 Hz /H3 277V 60 Hz, 1-Ph /H4 480V 60 Hz /H5 600V 60 Hz /H6 796V 60 Hz /H7 220V 50 Hz /H8 380V 50 Hz /H9 415V 50 Hz /H10 550V 50 Hz /H11 660V 50 Hz /H12 380V 60 Hz /H13 1500V 60 Hz	
	S2	System Voltage Selection — Specify on Order	N/C
Selector Switches ①	**S3**	HAND/OFF/AUTO	159.
	S4	HAND/AUTO	159.
	S6	RUN/OFF/AUTO	159.
	S7	AUTO/OFF/TEST	159.
	S8	AUTO/OFF/TEST Selector Switch with 1 Red RUN Pilot Light	315.
	S9	AUTO/OFF/TEST Selector Switch with 1 Red RUN Pilot Light and 1 Green Pilot Light	472.
	S10	OFF/AUTO	159.
	S11	START/STOP	159.
	S12	OFF/ON	159.
	S13 ②	HIGH/LOW	159.
	S14 ②	FAST/OFF/SLOW	159.
	S15 ②	SLOW/FAST	159.
	S16 ②	FORWARD/REVERSE	159.
	S17 ②	HIGH/OFF/LOW	159.
	S18 ②	HIGH/LOW/OFF/AUTO	246.
	S38 ②	INVERTER/OFF/BYPASS (AF91)	159.
	S41 ②	OPEN/OFF/CLOSE	159.
	S42 ②	FORWARD/OFF/REVERSE	159.
	S43 ②	FAST/OFF/SLOW/AUTO	246.
	S19 ②	Selector Switch Omitted (Pump Panels Only)	N/C
	S40	Selector Switch — Order by Description	③
Suppressor	**S24** ②	Transient Suppressor Mounted on Magnet Coil	62.
Surge Suppression	**S20**	MOV (IT)	276.
Sequence Timer	**S26** ②	Sequence Timer (Pump Panels)	555.
Sequence Protection	**S27** ②	Incomplete Sequence Protection	800.
Single Phase ②	**S29**	Convert Contactor or Starter from Three-Phase to Single-Phase — Install Jumper	29.
	S30	Single-Phase Rev. 120V	115.
	S31	Single-Phase Rev. 240V	115.
Surge Capacitor	**S37** ②	Surge Capacitor Wired to Disconnect Line Side	269.
Speed Potentiometer	**S39** ②	Speed Potentiometer (AF91)	390.

① When using 3-position selector switch with magnetic lighting contactor, mod **C20** must also be used (ECL04, ECL13, ECL15).
② Not available for IT Starters.
③ Consult factory for price.

Table 33-92. T — Timers, Time Delay Relays, Terminal Blocks, Terminal Points, Ring Lug Connections

Modification	Catalog Number Suffix	Description	Adder U.S. $
Timers	**T1** ④	Pneumatic Timer Installed on Contactor, Unwired, 30 Sec. Max.	570.
	T2 ④	Pneumatic Timer Installed on Contactor, Unwired, 180 Sec. Max.	570.
	T3	Pneumatic Timer Mounted in Enclosure, Unwired, 180 Sec. Max.	570.
	T25	Timer — Order by Description	⑤
Time Delay Relays	**T6**	Time Delay Relay, 3 Minutes Maximum, Unwired, ON DELAY	545.
	T7	Time Delay Relay, 3 Minutes Maximum, Unwired, OFF DELAY	545.
	T8	Time Delay Low Voltage Release Relay	745.
Terminal Blocks	**T9**	With 1 Single Circuit Terminal Block, Unwired	28.
	T10	With 2 Single Circuit Terminal Block, Unwired	55.
	T24 ④	Power Terminal Block for DeviceNet Overload	166.
Terminal Points	**T11**	With 6 Terminal Points, Unwired	162.
	T12	With 12 Terminal Points, Unwired	322.
	T13	With 18 Terminal Points, Unwired	482.
	T14	Terminal Point per Customer Specification, Unwired (Price Each)	28.
	T15	Terminal Point per Customer Specification, Wired (Price Each)	55.
	T21 ④	3 Terminals Mounted Between Contactor and Overload for Power Factor Capacitors — Sizes 0 – 2	35.
	T22 ④	3 Terminals Mounted Between Contactor and Overload for Power Factor Capacitors — Sizes 3 – 4	68.
	T23 ④	Quick-Connect Terminals Added to DP Contactor/Starter	166.
Ring Lug Connectors	**T16**	Ring Lug Connections on Power Wires	85.
	T17 ④	Ring Lug Connections on Control Wires	⑤

④ Not available for IT Starters.
⑤ Consult factory for price.

Table 33-93. U — Undervoltage Relay, Time Delay Undervoltage Relay

Modification	Catalog Number Suffix	Description	Adder U.S. $
Undervoltage Relays	**U2**	Undervoltage Relay, Adjustable	675.
Time Delay Undervoltage Relays	**U4** ⑥	Time Delay Undervoltage Relay, Non-adjustable	570.
	U5	Time Delay Undervoltage Relay, Adjustable	745.
Under- and Overvoltage Relay	**U7**	Under- and Overvoltage Relay	840.

⑥ Not available for IT Starters.

Discount Symbol **1CD-1C**

Modification Codes (Continued)

Table 33-94. V — Voltmeter, Varmeter, Vacuum Starter

Modification	Catalog Number Suffix	Description	Adder U.S. $
Voltmeters	**V1**	1 Panel Type Voltmeter Wired L1 – L2	1,325.
	V2	Panel Type Voltmeter and Selector Switch Wired to Read Three Line Voltages	2,010.
	V3 ①	Miniature Voltmeter Wired L1 – L2	675.
	V4 ①	Miniature Voltmeter and Selector Switch Wired to Read Three Line Voltages	1,080.
	V5	Switchboard Type Voltmeter Wired L1 – L2	1,325.
	V6 ①	Switchboard Type Voltmeter and Selector Switch Wired to Read Three Line Voltage	1,725.
	V7	3 Panel Type Voltmeters Wired in Each Phase	2,805.
	V8 ①	3 Miniature Voltmeters Wired in Each Phase	2,010.
	V9	3 Switchboard Type Voltmeters Wired in Each Phase	3,970.
	V10	Voltmeter — Order by Description	②

① NEMA 1/12 only.
② Consult factory for price.

Table 33-95. W — Wattmeter, Watt-Hour Meter, Wiremarkers, Enclosure Window, Wiring Diagram

Modification	Catalog Number Suffix	Description	Adder U.S. $
Wattmeter ③	**W1**	Wattmeter	2,720.
Watt-Hour Meter ③	**W5**	Watt-Hour Meter with Demand Attachment	2,870.
Wiremarkers	**W7**	Wiremarkers	150.
	W8	Wiremarkers — Order per Customer Diagram or Specifications	④
	W9	Wiremarkers — Order by Description	④
Window	**W11**	Enclosure Window (AF91 Only)	④
Wiring Diagram	**W12**	Reduced Copy of Custom Wiring Diagram Laminated on Inside of Door	161.

③ NEMA 1/12 only.
④ Consult factory for price.

Table 33-96. Z — IEC One Size Fits All

Modification	Catalog Number Suffix	Description	Adder U.S. $
IEC One Size Fits All Starters	**Z1**	One Size Fits All for DeviceNet	N/C
	Z2	Combination with 20A Class CC Fuses	N/C

Discount Symbol **1CD-1C**

Control Power Transformer Kits

Control Transformer Kit

These control transformer kits provide a convenient on-the-job addition of control transformers to the following NEMA 1, 3R, 4/4X and 12 enclosed starters. Adding or changing these kits does not affect the UL listing in most instances.

The transformer kit consists of:

- Control transformer
- Two primary and one secondary fuse
- Wires
- Mounting instruction publication

For Non-combination Starters

These kits may be used for transformer voltage conversion on Freedom NEMA, IEC and Advanced Design NEMA (Advantage) starters furnished from the factory with control transformers installed. Non-combination starters with CPTs factory installed are Class ECN07, ECA07, ECE07 and ECE11. These kits may also be installed in oversize enclosures that have been designed to accept transformers.

Combination Starters

Most combination starters have space for standard size (and 100 VA extra capacity) control power transformers. The panels are pre-drilled for mounting.

UL/CSA

UL Listed — File Number E10156, Guide XPTO.

Table 33-97. Standard Transformer Sizes ①

Size	VA Capacity		
	Advantage	Freedom	Vacuum
0	—	50	—
1, 2	100	100	—
3	100	150	—
4	100	200	100
5	250	200	150
6	250	250	350

① Non-reversing, single contactor only.

When Ordering Specify

- Catalog Number

Table 33-98. Control Transformer Kits

Continuous VA	Catalog Number					Price U.S. $
	Primary 208/277V Secondary 120V, 60 Hz	Primary 240/480V, 60 Hz 220/440V, 50 Hz Secondary 120V, 60 Hz 110V, 50 Hz	Primary 380V Secondary 110V, 50 Hz	Primary 600V, 60 Hz 550V, 50 Hz Secondary 120V, 60 Hz 110V, 50 Hz	Primary 240/480V Secondary 24V, 60 Hz	
50	C341AE	C341AC	C341AL	C341AD	C341AS	118.
75	C341BE	C341BC	C341BL	C341BD	C341BS	129.
100	C341CE	C341CC	C341CL	C341CD	C341CS	141.
150	C341DE	C341DC	C341DL	C341DD	C341DS	180.
200	C341EE	C341EC	C341EL	C341ED	C341ES	220.
250	C341FE	C341FC	C341FL	C341FD	C341FS	248.
300	C341GE	C341GC	C341GL	C341GD	C341GS	277.
350	C341HE	C341HC	C341HL	C341HD	C341HS	306.
500	C341JE	C341JC	C341JL	C341JD	C341JS	335.

Table 33-99. Approximate Dimensions and Shipping Weights

Continuous VA	Dimensions in Inches (mm)						Ship Wt. Lbs. (kg)
	Wide A	High B	Deep C	Mounting			
				D	E	Slots	
50	3.00 (76.2)	3.00 (76.2)	2.56 (65.0)	2.00 (50.8)	2.50 (63.5)	.203 x .375 (5.2 x 9.5)	3.0 (1.4)
75	3.50 (88.9)	3.00 (76.2)	2.56 (65.0)	2.50 (63.5)	2.50 (63.5)	.203 x .375 (5.2 x 9.5)	4.3 (2.0)
100	3.38 (85.9)	3.38 (85.9)	2.88 (73.2)	2.38 (60.5)	2.81 (71.4)	.203 x .375 (5.2 x 9.5)	4.6 (2.1)
150	4.00 (101.6)	3.75 (95.3)	3.18 (80.8)	2.88 (73.2)	3.12 (79.2)	.203 x .375 (5.2 x 9.5)	7.0 (3.2)
200	4.00 (101.6)	4.50 (114.3)	3.81 (96.8)	2.50 (63.5)	3.75 (95.3)	.203 x .375 (5.2 x 9.5)	7.7 (3.5)
250	4.38 (111.3)	4.50 (114.3)	3.81 (96.8)	2.88 (73.2)	3.75 (95.3)	.203 x .375 (5.2 x 9.5)	10.0 (4.5)
300	4.75 (120.7)	4.50 (114.3)	3.81 (96.8)	3.25 (82.6)	3.75 (95.3)	.203 x .375 (5.2 x 9.5)	13.0 (5.9)
350	5.25 (133.4)	4.50 (114.3)	3.81 (96.8)	3.75 (95.3)	3.75 (95.3)	.203 x .375 (5.2 x 9.5)	14.0 (6.4)
500	5.50 (139.7)	5.25 (133.4)	4.75 (120.7)	4.25 (108.0)	4.38 (111.3)	.312 x .688 (7.9 x 17.5)	18.0 (8.2)

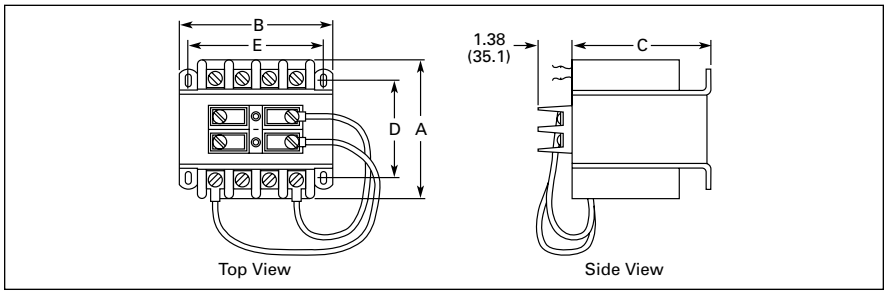

Figure 33-22. Open Type — 50 VA – 500 VA with Fuse Block

Discount Symbol **1CD-1C**

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Cover Control

Non-reversing

Flange Control Kits

For on-the-job conversion of NEMA 1, 3R, 4X and 12 enclosed starters. Knockouts are provided on the NEMA 1 flange. NEMA 3R, 4X and 12 have prepunched holes with removable hole plugs.

Factory Installed Pilot Devices

To order factory installed pilot devices, change the 9th character of the Catalog Number to the alpha shown in the table below. Example: to order an **ECN0514CAA** with START/STOP pushbuttons and a red pilot light, change the **A** to a **C**, i.e. ECN0514C**C**A.

Figure 33-23.

Figure 33-24.

Table 33-100. Non-reversing Pilot Devices

Description	Non-combination Sizes 00 – 4 Sizes A – M NEMA/IEC Freedom Series NEMA 1 Enclosure only Cover Mounted Field Installation Kits ④ See Figure 33-23		Non-combination NEMA 1, Sizes 5 – 9 NEMA 1, Sizes N – V All NEMA 3R, 4X, 12 All IT Soft Starts Combination Freedom NEMA only ① Advantage ② IT Cover Mounted Field Installation Kits ④ See Figure 33-24		Factory Installed Flange Control		
					Position 9 Alpha	NEMA 1 only Sizes 00 – 4 Sizes A – M Non-combo. only ③ See Figure 33-23	NEMA 1 Sizes 5 – 9 Sizes N – V NEMA 3R, 4X, 12 ② All Combination See Figure 33-24
	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $		Adder U.S. $	Adder U.S. $
No Cover Mounted Pilot Devices	**C400GK0**	7.	—	—	**A**	—	—
START/STOP Pushbuttons	**C400GK1**	55.	**C400T1**	55.	**B**	77.	159.
with Red RUN Pilot Light	**C400GK12** ③	155.	—	—	**C**	204.	315.
with Red RUN/Green OFF Lights	**C400GK16** ③	252.	—	—	**D**	333.	472.
ON/OFF Pushbuttons	—	—	**C400T2**	55.	**E**	—	159.
with Red RUN Pilot Light	—	—	—	—	**F**	—	315.
with Red RUN/Green OFF Lights	—	—	—	—	**G**	—	472.
HAND/OFF/AUTO Selector Switch	**C400GK3**	55.	**C400T12**	55.	**H**	77.	159.
with Red RUN Pilot Light	**C400GK32** ③	155.	—	—	**J**	204.	315.
with Red RUN/Green OFF Lights	**C400GK36** ③	252.	—	—	**K**	333.	472.
START Pushbutton	—	—	**C400T3**	39.	**L**	—	159.
ON Pushbutton	—	—	**C400T4**	39.	**M**	—	159.
OFF Pushbutton	—	—	**C400T5**	39.	**N**	—	159.
Red RUN Pilot Light	**C400GK42** ③	101.	**C400T9** ③	101.	**P**	129.	159.
Green OFF	**C400GK41** ③	101.	**C400T10** ③	101.	**Q**	129.	159.
Red RUN/Green OFF Pilot Lights	**C400GK46** ③	201.	**C400T11** ③	201.	**R**	257.	315.
START/STOP Selector Switch	—	—	**C400T13**	55.	**S**	—	159.
with Red RUN Pilot Light	—	—	—	—	**T**	—	315.
with Red RUN/Green OFF Lights	—	—	—	—	**U**	—	472.
ON/OFF Selector Switch	—	—	**C400T14**	55.	**V**	—	159.
with Red RUN Pilot Light	—	—	—	—	**W**	—	315.
with Red RUN/Green OFF Lights	—	—	—	—	**X**	—	472.

① For IEC Combination Cover Control, see **Page 34-71**.

② For ACM Cover Control Option, see **Page 33-101**.

③ Add Code Letter from the table below to Catalog Number for voltage — Kits only.
Example: C400T9**B**.

Rating	Code Letter	Rating	Code Letter	Rating	Code Letter
120V 60 Hz	**A**	240V 60 Hz	**B**	480V 60 Hz	**C**
208V 60 Hz	**E**	380V 50 Hz	**L**	600V 60 Hz	**D**

Note: 120V only for Advantage.

④ Additional Kits available. See Page 11-19 of P.G.3.02.T.E.

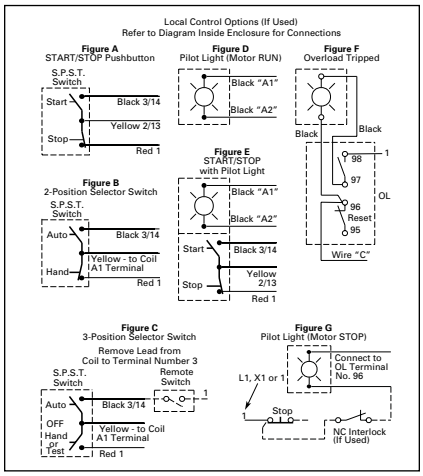

Figure 33-25. Wiring Diagrams

Discount Symbol **1CD-1C**

Reversing

Flange Control Kits

For on-the-job conversion of NEMA 1, 3R, 4X and 12 enclosed starters. Knockouts are provided on the NEMA 1 flange. NEMA 3R, 4X and 12 have prepunched holes with removable hole plugs.

Factory Installed Pilot Devices

To order factory installed pilot devices, change the 9th character of the Catalog Number to the alpha shown in the table below. Example: to order an **ECN0614CAA** with FOR/REV/STOP pushbuttons and 2 red pilot lights, change the **A** to a **C**, i.e. ECN0614C**C**A.

Figure 33-26.

Figure 33-27.

Table 33-101. Reversing Pilot Devices

Description	Non-combination Sizes 00 – 4 Sizes A – M NEMA/IEC Freedom Series NEMA 1 Enclosure only Cover Mounted Field Installation Kits ⑤ See Figure 33-26.		Non-combination NEMA 1, Sizes 5 – 9 NEMA 1, Sizes N – V All NEMA 3R, 4X, 12 All IT Soft Starts Combination Freedom NEMA only ① Advantage ② IT Cover Mounted Field Installation Kits ⑤ See Figure 33-27.		Factory Installed Flange Control		
					Position 9 Alpha	NEMA 1 only Sizes 00 – 4 Sizes A – M Non-combo. only ③ See Figure 33-26.	NEMA 1 Sizes 5 – 9 Sizes N – V NEMA 3R, 4X, 12 ② All Combination See Figure 33-27.
	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $		Adder U.S. $	Adder U.S. $
No Cover Mounted Pilot Devices	**C400GK0**	7.	—	—	**A**	—	—
FOR/REV/STOP Pushbuttons	**C400GR1**	135.	**C400T6**	168.	**B**	269.	269.
with 2 Red Pilot Lights	**C400GR14** ③	333.	—	—	**C**	530.	585.
with 2 Red/1 Green Pilot Lights	—	—	—	—	**D**	—	750.
UP/STOP/DOWN Pushbuttons	**C400GR2**	135.	—	—	**E**	269.	269.
with 2 Red Pilot Lights	**C400GR24** ③	333.	—	—	**F**	530.	585.
FOR/OFF/REV Selector Switch	—	—	**C400T15**	113.	**H**	—	159.
with 2 Red Pilot Lights	—	—	—	—	**J**	—	472.
with 2 Red/1 Green Pilot Lights	—	—	—	—	**K**	—	635.
Two Red Pilot Lights	**C400GK44** ③	201.	④	—	**P**	269.	315.
One Green Pilot Light	**C400GK41** ③	101.	**C400T10** ③	101.	**Q**	129.	159.
Two Red/One Green Pilot Lights	—	—	—	—	**R**	—	472.
OPEN/OFF/CLOSE Selector Switch	—	—	**C400T16**	113.	**V**	—	159.
with 2 Red Pilot Lights	—	—	—	—	**W**	—	472.
with 2 Red/1 Green Pilot Lights	—	—	—	—	**X**	—	635.

① For IEC Combination Cover Control, see **Page 34-71**.

② For ACM Cover Control Option, see **Page 33-101**.

③ Add Code Letter from the table below to Catalog Number for voltage — Kits only. Example: C400T10**B**.

Rating	Code Letter	Rating	Code Letter	Rating	Code Letter
120V 60 Hz	**A**	240V 60 Hz	**B**	480V 60 Hz	**C**
208V 60 Hz	**E**	380V 50 Hz	**L**	600V 60 Hz	**D**

Note: 120V only for Advantage.

④ Order Quantity (2) of **C400T10**.

⑤ Additional Kits available. See Page 11-9 of P.G.3.02.T.E.

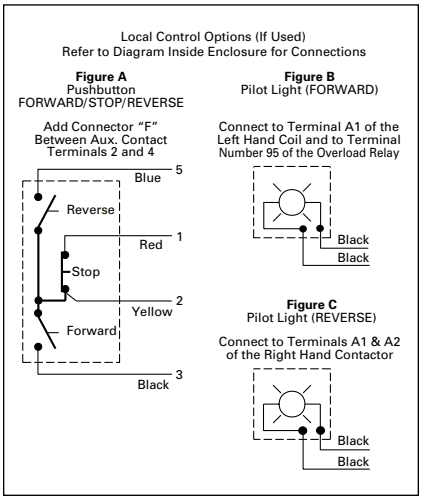

Figure 33-28. Wiring Diagrams

Note: For additional wiring diagrams, see Pages 1-77 –1-85 of P.G.3.02.T.E.

Discount Symbol **1CD-1C**

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Catalog Number Selection

Table 33-102. NEMA Freedom Line Enclosed Control Catalog Numbering System

E C N 2 2 2 1 A A F -

Design	Page
N - NEMA	**33-40**
E - IEC	**34-69**
A - Advantage	**33-100**
L - Lighting	**37-13**
S - Solid-State	**39-20**
V - Vacuum	①

Class	NEMA Page
01 - Contactors	①
02 - Reversing Contactors	①
05 - FVNR Starter, Non-combination	**33-53**
06 - Reversing, Non-combination	**33-55**
07 - FVNR Non-combination, with CPT	**33-57**
08 - Single-Phase FVNR (Freedom Only)	①
16 - Combination with Disconnect Switch	**33-58**
17 - Reversing, Combination with Disconnect Switch	**33-62**
18 - Combination with Disconnect Switch, with CPT	**33-65**
22 - Combination with HMCP/E	**33-67**
23 - Reversing, Combination with HMCP/E	**33-69**
24 - Combination with HMCP/E with CPT	**33-71**
33 - Multispeed 2S2W Non-combination	①
34 - Multispeed 2S1W CT or VT Non-combination	①
35 - Multispeed 2S1W CH Non-combination	①
36 - Multispeed with Disconnect Switch, 2S2W	①
37 - Multispeed with Disconnect Switch, 2S1W CT or VT	①
38 - Multispeed with Disconnect Switch, 2S1W CH	①
39 - Multispeed with HMCP/E, 2S2W	①
40 - Multispeed with HMCP/E, 2S1W CT or VT	①
41 - Multispeed with HMCP/E, 2S1W CH	①
42 - Autotransformer, Non-combination	①
43 - Autotransformer, with Disconnect Switch	①
44 - Autotransformer, with HMCP/E	①
45 - Part-Winding, Non-combination	①
46 - Part-Winding, with Disconnect Switch	①
47 - Part-Winding, with Circuit Breaker	①
48 - Y-D, Open Transition, Non-combination	①
49 - Y-D, Open Transition, with Disconnect Switch	①
50 - Y-D, Open Transition, with Circuit Breaker	①
51 - Y-D, Closed Transition, Non-combination	①
52 - Y-D, Closed Transition, with Disconnect Switch	①
53 - Y-D, Closed Transition, with Circuit Breaker	①
54 - Std Width Pump Panel, with Disconnect Switch	①
55 - Std Width Pump Panel, with HMCP/E	①
62 - Autotransformer Pump Panel, Disconnect Switch	①
63 - Autotransformer Pump Panel, HMCP/E	①
64 - Part-Winding Pump Panel, Disconnect	①
65 - Part-Winding Pump Panel, Circuit Breaker	①
68 - Duplex, Non-combination	①
69 - Duplex, with Disconnect Switch	①
70 - Duplex, with HMCP/E	①

Modification Codes
(See **Pages 33-41 – 33-48**)

Cover Control
(Starters Only)
(See **Pages 33-50 – 33-51**)

Number of Poles
(Contactors Only)

Coil Voltage and/or Control Transformers
(See Tables Below)

Disconnect Fuse Clip Ratings

A - None	**G** - 100A/600V R	**N** - 600A/600V R
B - 30A/250V R	**H** - 200A/250V R	**P** - 800A/600V L
C - 30A/600V R	**J** - 200A/600V R	**Q** - 1200A/600V L
D - 60A/250V R	**K** - 400A/250V R	**R** - 1600A/600V L
E - 60A/600V R	**L** - 400A/600V R	**S** - 2000A/600V L
F - 100A/250V R	**M** - 600A/250V R	**T** - by Description

HMCP or Breaker Ratings

A - None	**G** - 100A	**N** - 1000A	**5** - 3A②
B - 3A	**H** - 150A	**P** - 1200A	**6** - 7A②
C - 7A	**J** - 250A	**Q** - 2000A	**7** - 15A②
D - 15A	**K** - 400A	**R** - 3000A	**8** - 30A②
E - 30A	**L** - 600A	**T** - by Description	**9** - 50A②
F - 50A	**M** - 800A		**I** - 100A②

Enclosure Types

1 - Type 1 – General Purpose
2 - Type 3R – Rainproof
3 - Type 4 – Watertight (Painted Steel)
4 - Type 4X – Watertight (Stainless Steel)
5 - Type 4X – Corrosion (nonmetallic) (Section 9)
6 - Type 7/9 – Bolted Hazardous Location (Section 8)
7 - Type 7/9 – Threaded Hazardous Location (Section 8)
8 - Type 12 – Dust-Tight
9 - Type 12 – Dust-Tight with Safety Door Interlock

NEMA Size

A - Size 00	**5** - Size 5
0 - Size 0	**6** - Size 6
1 - Size 1	**7** - Size 7
2 - Size 2	**8** - Size 8
3 - Size 3	**9** - Size 9
4 - Size 4	

① Refer to *Enclosed Control Product Guide,* P.G.3.02.T.E.
② Use for Sizes 0 – 3, HMCP 600V applications only.

Table 33-103. Magnetic Coil Codes (System Voltage) ③

Code	Magnet Coil	Code	Magnet Coil	Code	Magnet Coil
A	120/60 110/50	**K**	240/50	**U**	24/50
B	240/60 220/50	**L**	380/50	**V**	32/50
C	480/60 440/50	**M**	415/50	**W**	48/60
D	600/60 550/50	**P**	12V DC	**X**	104 – 120/60
E	208/60	**Q**	24V DC	**Y**	48/50
G	550/50	**R**	48V DC	**Z**	By Description
H	277/60	**S**	125V DC		
J	208 – 240/60	**T**	24/60		

③ When control power transformer modification codes (**C1** – **C11**) are used or when starter class includes CPT (i.e. ECN07, 18) see table to the right for system voltage code.

Table 33-104. Control Power Transformer Codes (System Voltage)

Code	Primary	Secondary
B	240/480 – 220/440 Wired for 240V	120/60 – 110/50
C	240/480 – 220/440 Wired for 480V	120/60 – 110/50
D	600/60 – 550/50	120/60 – 110/50
E	208/60	120/60
H	277/60	120/60
L	380/50	110/50
M	415/50	110/50
Q	208/60	24
R	240/480 – 220/440 Wired for 240V	24
S	240/480 – 220/440 Wired for 480V	24
T	600/60	24
U	277/60	24
V	380/50	24
W	415/50	24
X	240/480/600 Wired for 480V	120
Y	240/480/600 Wired for 480V	24
Z	By Description	

Product Selection — Non-combination Starters

- Full Voltage
- Interchangeable Heater OLR
- 600V Maximum

Table 33-105. Class ECN05 — NEMA — Non-combination — Non-reversing

Motor Voltage	Max. hp Rating ①	Magnet Coil Voltage	3-Pole, NEMA 1 General Purpose		3-Pole, NEMA 3R Rainproof		3-Pole, NEMA 4X ③ Watertight & Dust-Tight Stainless Steel		3-Pole, NEMA 12 Dust-Tight Industrial External Reset (NEMA 3R) ②	
			Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
NEMA Size 00										
—	—	120	**ECN05A1AAA**	195.	(Select Starter from Size 0 Listing)					
200	1-1/2	208	**ECN05A1EAA**	195.						
230	1-1/2	240	**ECN05A1BAA**	195.						
460	2	480	**ECN05A1CAA**	195.						
575	2	600	**ECN05A1DAA**	195.						
NEMA Size 0										
—	—	120	**ECN0501AAA**	242.	**ECN0502AAA**	322.	**ECN0504AAA**	477.	**ECN0508AAA**	322.
200	3	208	**ECN0501EAA**	242.	**ECN0502EAA**	322.	**ECN0504EAA**	477.	**ECN0508EAA**	322.
230	3	240	**ECN0501BAA**	242.	**ECN0502BAA**	322.	**ECN0504BAA**	477.	**ECN0508BAA**	322.
460	5	480	**ECN0501CAA**	242.	**ECN0502CAA**	322.	**ECN0504CAA**	477.	**ECN0508CAA**	322.
575	5	600	**ECN0501DAA**	242.	**ECN0502DAA**	322.	**ECN0504DAA**	477.	**ECN0508DAA**	322.
NEMA Size 1										
—	—	120	**ECN0511AAA**	275.	**ECN0512AAA**	354.	**ECN0514AAA**	520.	**ECN0518AAA**	354.
200	7-1/2	208	**ECN0511EAA**	275.	**ECN0512EAA**	354.	**ECN0514EAA**	520.	**ECN0518EAA**	354.
230	7-1/2	240	**ECN0511BAA**	275.	**ECN0512BAA**	354.	**ECN0514BAA**	520.	**ECN0518BAA**	354.
460	10	480	**ECN0511CAA**	275.	**ECN0512CAA**	354.	**ECN0514CAA**	520.	**ECN0518CAA**	354.
575	10	600	**ECN0511DAA**	275.	**ECN0512DAA**	354.	**ECN0514DAA**	520.	**ECN0518DAA**	354.
NEMA Size 2										
—	—	120	**ECN0521AAA**	550.	**ECN0522AAA**	690.	**ECN0524AAA**	1,025.	**ECN0528AAA**	690.
200	15	208	**ECN0521EAA**	550.	**ECN0522EAA**	690.	**ECN0524EAA**	1,025.	**ECN0528EAA**	690.
230	25	240	**ECN0521BAA**	550.	**ECN0522BAA**	690.	**ECN0524BAA**	1,025.	**ECN0528BAA**	690.
460	25	480	**ECN0521CAA**	550.	**ECN0522CAA**	690.	**ECN0524CAA**	1,025.	**ECN0528CAA**	690.
575	—	600	**ECN0521DAA**	550.	**ECN0522DAA**	690.	**ECN0524DAA**	1,025.	**ECN0528DAA**	690.
NEMA Size 3										
—	—	120	**ECN0531AAA**	910.	**ECN0532AAA**	1,085.	**ECN0534AAA**	1,585.	**ECN0538AAA**	1,085.
200	25	208	**ECN0531EAA**	910.	**ECN0532EAA**	1,085.	**ECN0534EAA**	1,585.	**ECN0538EAA**	1,085.
230	30	240	**ECN0531BAA**	910.	**ECN0532BAA**	1,085.	**ECN0534BAA**	1,585.	**ECN0538BAA**	1,085.
460	50	480	**ECN0531CAA**	910.	**ECN0532CAA**	1,085.	**ECN0534CAA**	1,585.	**ECN0538CAA**	1,085.
575	50	600	**ECN0531DAA**	910.	**ECN0532DAA**	1,085.	**ECN0534DAA**	1,585.	**ECN0538DAA**	1,085.

Starters do not include heater packs. Select 1 carton of 3 heater packs. For Heater Pack Selection, see **Pages 33-36 – 33-37.**

① Maximum horsepower rating of starters for 380V 50 Hz applications:

NEMA Size	00	0	1	2	3	4	5	6
Horsepower	1-1/2	5	10	25	50	75	150	300

② Suitable for outdoor application when properly installed — see Page i-5 of P.G.3.02.T.E.

③ NEMA 4X (Stainless steel) Sizes 0 – 6, NEMA 4 (Painted steel) Sizes 7 – 9.

Note: Reference to *Enclosed Control Product Guide* — PG.3.02.T.E.

Description	Page
Accessories, Kits Wiring Diagrams Dimensions	11-1 to 11-11 1-77 to 1-85 12-1 to 12-24
Technical Data Multi-Speed	14-1 to 14-8 1-28 to 1-30

Catalog Number ECN0511CBA

Cover Mounted Control . . . . . **Page 33-50**
Modifications/
Accessories . . . . . **Pages 33-41 – 33-49**
Discount Symbol **1CD-1C**

Table 33-105. Class ECN05 — NEMA — Non-combination — Non-reversing (Continued)

Motor Voltage	Max. hp Rating ①	Magnet Coil Voltage	3-Pole, NEMA 1 General Purpose		3-Pole, NEMA 3R Rainproof		3-Pole, NEMA 4X ③ Watertight & Dust-Tight Stainless Steel		3-Pole, NEMA 12 Dust-Tight Industrial External Reset (NEMA 3R) ②	
			Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
NEMA Size 4										
—	—	120	**ECN0541AAA**	2,040.	**ECN0542AAA**	2,615.	**ECN0544AAA**	3,200.	**ECN0548AAA**	2,615.
200	40	208	**ECN0541EAA**	2,040.	**ECN0542EAA**	2,615.	**ECN0544EAA**	3,200.	**ECN0548EAA**	2,615.
230	50	240	**ECN0541BAA**	2,040.	**ECN0542BAA**	2,615.	**ECN0544BAA**	3,200.	**ECN0548BAA**	2,615.
460	100	480	**ECN0541CAA**	2,040.	**ECN0542CAA**	2,615.	**ECN0544CAA**	3,200.	**ECN0548CAA**	2,615.
575	100	600	**ECN0541DAA**	2,040.	**ECN0542DAA**	2,615.	**ECN0544DAA**	3,200.	**ECN0548DAA**	2,615.
NEMA Size 5										
—	—	120	**ECN0551AAA**	4,810.	**ECN0552AAA**	5,390.	**ECN0554AAA**	6,280.	**ECN0558AAA**	5,390.
200	75	208	**ECN0551EAA**	4,810.	**ECN0552EAA**	5,390.	**ECN0554EAA**	6,280.	**ECN0558EAA**	5,390.
230	100	240	**ECN0551BAA**	4,810.	**ECN0552BAA**	5,390.	**ECN0554BAA**	6,280.	**ECN0558BAA**	5,390.
460	200	480	**ECN0551CAA**	4,810.	**ECN0552CAA**	5,390.	**ECN0554CAA**	6,280.	**ECN0558CAA**	5,390.
575	200	600	**ECN0551DAA**	4,810.	**ECN0552DAA**	5,390.	**ECN0554DAA**	6,280.	**ECN0558DAA**	5,390.
NEMA Size 6										
200	150	208	**ECN0561EAA**	13,550.	**ECN0562EAA**	15,340.	**ECN0564EAA**	16,880.	**ECN0568EAA**	15,340.
230	200	240	**ECN0561BAA**	13,550.	**ECN0562BAA**	15,340.	**ECN0564BAA**	16,880.	**ECN0568BAA**	15,340.
460	400	480	**ECN0561CAA**	13,550.	**ECN0562CAA**	15,340.	**ECN0564CAA**	16,880.	**ECN0568CAA**	15,340.
575	400	600	**ECN0561DAA**	13,550.	**ECN0562DAA**	15,340.	**ECN0564DAA**	16,880.	**ECN0568DAA**	15,340.
NEMA Size 7										
230	300	240	**ECN0571BAA**	17,520.	**ECN0572BAA**	19,730.	**ECN0573BAA**	20,760.	**ECN0578BAA**	19,720.
460	600	480	**ECN0571CAA**	17,520.	**ECN0572CAA**	19,730.	**ECN0573CAA**	20,760.	**ECN0578CAA**	19,720.
575	600	600	**ECN0571DAA**	17,520.	**ECN0572DAA**	19,730.	**ECN0573DAA**	20,760.	**ECN0578DAA**	19,720.
NEMA Size 8										
230	450	240	**ECN0581BAA**	24,990.	**ECN0582BAA**	26,790.	**ECN0583BAA**	29,290.	**ECN0588BAA**	26,790.
460	900	480	**ECN0581CAA**	24,990.	**ECN0582CAA**	26,790.	**ECN0583CAA**	29,290.	**ECN0588CAA**	26,790.
575	900	600	**ECN0581DAA**	24,990.	**ECN0582DAA**	26,790.	**ECN0583DAA**	29,290.	**ECN0588DAA**	26,790.
NEMA Size 9										
230	800	240	**ECN0591BAA**	38,910.	**ECN0592BAA**	40,710.	**ECN0593BAA**	43,390.	**ECN0598BAA**	40,710.
460	1600	480	**ECN0591CAA**	38,910.	**ECN0592CAA**	40,710.	**ECN0593CAA**	43,390.	**ECN0598CAA**	40,710.
575	1600	600	**ECN0591DAA**	38,910.	**ECN0592DAA**	40,710.	**ECN0593DAA**	43,390.	**ECN0598DAA**	40,710.

Starters do not include heater packs. Select 1 carton of 3 heater packs. For Heater Pack Selection, see **Pages 33-36 – 33-37**.

① Maximum horsepower rating of starters for 380V 50 Hz applications:

NEMA Size	00	0	1	2	3	4	5	6
Horsepower	1-1/2	5	10	25	50	75	150	300

② Suitable for outdoor application when properly installed — see Page i-5 of P.G.3.02.T.E.

③ NEMA 4X (Stainless steel) Sizes 0 – 6, NEMA 4 (Painted steel) Sizes 7 – 9.

Note: Reference to *Enclosed Control Product Guide* — PG.3.02.T.E.

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Discount Symbol **1CD-1C**

Table 33-106. Class ECN06 — NEMA — Non-combination — Reversing

Motor Voltage	Max. hp Rating ①	Magnet Coil Voltage	3-Pole, NEMA 1 General Purpose		3-Pole, NEMA 3R Rainproof		3-Pole, NEMA 4X ③ Watertight & Dust-Tight Stainless Steel		3-Pole, NEMA 12 Dust-Tight Industrial External Reset (NEMA 3R) ②	
			Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
NEMA Size 00										
—	—	120	**ECN06A1AAA**	461.	(Select Starter from Size 0 Listing)					
200	1-1/2	208	**ECN06A1EAA**	461.						
230	1-1/2	240	**ECN06A1BAA**	461.						
460	2	480	**ECN06A1CAA**	461.						
575	2	600	**ECN06A1DAA**	461.						
NEMA Size 0										
—	—	120	**ECN0601AAA**	550.	**ECN0602AAA**	665.	**ECN0604AAA**	850.	**ECN0608AAA**	665.
200	3	208	**ECN0601EAA**	550.	**ECN0602EAA**	665.	**ECN0604EAA**	850.	**ECN0608EAA**	665.
230	3	240	**ECN0601BAA**	550.	**ECN0602BAA**	665.	**ECN0604BAA**	850.	**ECN0608BAA**	665.
460	5	480	**ECN0601CAA**	550.	**ECN0602CAA**	665.	**ECN0604CAA**	850.	**ECN0608CAA**	665.
575	5	600	**ECN0601DAA**	550.	**ECN0602DAA**	665.	**ECN0604DAA**	850.	**ECN0608DAA**	665.
NEMA Size 1										
—	—	120	**ECN0611AAA**	630.	**ECN0612AAA**	750.	**ECN0614AAA**	1,055.	**ECN0618AAA**	750.
200	7-1/2	208	**ECN0611EAA**	630.	**ECN0612EAA**	750.	**ECN0614EAA**	1,055.	**ECN0618EAA**	750.
230	7-1/2	240	**ECN0611BAA**	630.	**ECN0612BAA**	750.	**ECN0614BAA**	1,055.	**ECN0618BAA**	750.
460	10	480	**ECN0611CAA**	630.	**ECN0612CAA**	750.	**ECN0614CAA**	1,055.	**ECN0618CAA**	750.
575	10	600	**ECN0611DAA**	630.	**ECN0612DAA**	750.	**ECN0614DAA**	1,055.	**ECN0618DAA**	750.
NEMA Size 2										
—	—	120	**ECN0621AAA**	1,215.	**ECN0622AAA**	1,415.	**ECN0624AAA**	1,905.	**ECN0628AAA**	1,415.
200	10	208	**ECN0621EAA**	1,215.	**ECN0622EAA**	1,415.	**ECN0624EAA**	1,905.	**ECN0628EAA**	1,415.
230	15	240	**ECN0621BAA**	1,215.	**ECN0622BAA**	1,415.	**ECN0624BAA**	1,905.	**ECN0628BAA**	1,415.
460	25	480	**ECN0621CAA**	1,215.	**ECN0622CAA**	1,415.	**ECN0624CAA**	1,905.	**ECN0628CAA**	1,415.
575	25	600	**ECN0621DAA**	1,215.	**ECN0622DAA**	1,415.	**ECN0624DAA**	1,905.	**ECN0628DAA**	1,415.
NEMA Size 3										
—	—	120	**ECN0631AAA**	2,020.	**ECN0632AAA**	2,460.	**ECN0634AAA**	3,050.	**ECN0638AAA**	2,460.
200	25	208	**ECN0631EAA**	2,020.	**ECN0632EAA**	2,460.	**ECN0634EAA**	3,050.	**ECN0638EAA**	2,460.
230	30	240	**ECN0631BAA**	2,020.	**ECN0632BAA**	2,460.	**ECN0634BAA**	3,050.	**ECN0638BAA**	2,460.
460	50	480	**ECN0631CAA**	2,020.	**ECN0632CAA**	2,460.	**ECN0634CAA**	3,050.	**ECN0638CAA**	2,460.
575	50	600	**ECN0631DAA**	2,020.	**ECN0632DAA**	2,460.	**ECN0634DAA**	3,050.	**ECN0638DAA**	2,460.

Starters do not include heater packs. Select 1 carton of 3 heater packs. For Heater Pack Selection, see **Pages 33-36 – 33-37**.

① Maximum horsepower rating of starters for 380V 50 Hz applications:

NEMA Size	00	0	1	2	3	4	5	6
Horsepower	1-1/2	5	10	25	50	75	150	300

② Suitable for outdoor application when properly installed — see Page i-5 of P.G.3.02.T.E.

③ NEMA 4X (Stainless steel) Sizes 0 – 5, NEMA 4 (Painted steel) Sizes 6 – 9.

Note: Reference to *Enclosed Control Product Guide* — PG.3.02.T.E.

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Discount Symbol **1CD-1C**

Table 33-106. Class ECN06 — NEMA — Non-combination, Reversing (Continued)

Motor Voltage	Max. hp Rating ①	Magnet Coil Voltage	3-Pole, NEMA 1 General Purpose		3-Pole, NEMA 3R Rainproof		3-Pole, NEMA 4X ③ Watertight & Dust-Tight Stainless Steel		3-Pole, NEMA 12 Dust-Tight Industrial External Reset (NEMA 3R) ②	
			Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
NEMA Size 4										
—	—	120	**ECN0641AAA**	4,820.	**ECN0642AAA**	5,510.	**ECN0644AAA**	6,640.	**ECN0648AAA**	5,510.
200	40	208	**ECN0641EAA**	4,820.	**ECN0642EAA**	5,510.	**ECN0644EAA**	6,640.	**ECN0648EAA**	5,510.
230	50	240	**ECN0641BAA**	4,820.	**ECN0642BAA**	5,510.	**ECN0644BAA**	6,640.	**ECN0648BAA**	5,510.
460	100	480	**ECN0641CAA**	4,820.	**ECN0642CAA**	5,510.	**ECN0644CAA**	6,640.	**ECN0648CAA**	5,510.
575	100	600	**ECN0641DAA**	4,820.	**ECN0642DAA**	5,510.	**ECN0644DAA**	6,640.	**ECN0648DAA**	5,510.
NEMA Size 5										
—	—	120	**ECN0651AAA**	10,590.	**ECN0652AAA**	12,060.	**ECN0654AAA**	13,930.	**ECN0658AAA**	12,060.
200	75	208	**ECN0651EAA**	10,590.	**ECN0652EAA**	12,060.	**ECN0654EAA**	13,930.	**ECN0658EAA**	12,060.
230	100	240	**ECN0651BAA**	10,590.	**ECN0652BAA**	12,060.	**ECN0654BAA**	13,930.	**ECN0658BAA**	12,060.
460	200	480	**ECN0651CAA**	10,590.	**ECN0652CAA**	12,060.	**ECN0654CAA**	13,930.	**ECN0658CAA**	12,060.
575	200	600	**ECN0651DAA**	10,590.	**ECN0652DAA**	12,060.	**ECN0654DAA**	13,930.	**ECN0658DAA**	12,060.
NEMA Size 6										
200	150	208	**ECN0661EAA**	23,590.	**ECN0662EAA**	25,390.	**ECN0663EAA**	26,930.	**ECN0668EAA**	25,390.
230	200	240	**ECN0661BAA**	23,590.	**ECN0662BAA**	25,390.	**ECN0663BAA**	26,930.	**ECN0668BAA**	25,390.
460	400	480	**ECN0661CAA**	23,590.	**ECN0662CAA**	25,390.	**ECN0663CAA**	26,930.	**ECN0668CAA**	25,390.
575	400	600	**ECN0661DAA**	23,590.	**ECN0662DAA**	25,390.	**ECN0663DAA**	26,930.	**ECN0668DAA**	25,390.
NEMA Size 7										
230	300	240	**ECN0671BAA**	32,050.	**ECN0672BAA**	33,850.	**ECN0673BAA**	35,380.	**ECN0678BAA**	33,850.
460	600	480	**ECN0671CAA**	32,050.	**ECN0672CAA**	33,850.	**ECN0673CAA**	35,380.	**ECN0678CAA**	33,850.
575	600	600	**ECN0671DAA**	32,050.	**ECN0672DAA**	33,850.	**ECN0673DAA**	35,380.	**ECN0678DAA**	33,850.
NEMA Size 8										
230	450	240	**ECN0681BAA**	45,060.	**ECN0682BAA**	46,860.	**ECN0683BAA**	48,390.	**ECN0688BAA**	46,860.
460	900	480	**ECN0681CAA**	45,060.	**ECN0682CAA**	46,860.	**ECN0683CAA**	48,390.	**ECN0688CAA**	46,860.
575	900	600	**ECN0681DAA**	45,060.	**ECN0682DAA**	46,860.	**ECN0683DAA**	48,390.	**ECN0688DAA**	46,860.
NEMA Size 9										
230	800	240	**ECN0691BAA**	69,870.	**ECN0692BAA**	72,700.	**ECN0693BAA**	75,370.	**ECN0698BAA**	72,700.
460	1600	480	**ECN0691CAA**	69,870.	**ECN0692CAA**	72,700.	**ECN0693CAA**	75,370.	**ECN0698CAA**	72,700.
575	1600	600	**ECN0691DAA**	69,870.	**ECN0692DAA**	72,700.	**ECN0693DAA**	75,370.	**ECN0698DAA**	72,700.

Starters do not include heater packs. Select 1 carton of 3 heater packs. For Heater Pack Selection, see **Pages 33-36 – 33-37**.

① Maximum horsepower rating of starters for 380V 50 Hz applications:

NEMA Size	00	0	1	2	3	4	5	6
Horsepower	1-1/2	5	10	25	50	75	150	300

② Suitable for outdoor application when properly installed — see Page i-5 of P.G.3.02.T.E.

③ NEMA 4X (Stainless steel) Sizes 0 – 5, NEMA 4 (Painted steel) Sizes 6 – 9.

Note: Reference to *Enclosed Control Product Guide* — PG.3.02.T.E.

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Modifications/
Accessories ..... **Pages 33-41 – 33-49**
Discount Symbol **1CD-1C**

Table 33-107. Class ECN07 — NEMA — Non-combination with CPT — Non-reversing

NEMA Size	Primary Voltage ③	Max. hp Rating ①	Secondary Voltage / Magnet Coil Voltage	3-Pole, NEMA 1 General Purpose		3-Pole, NEMA 3R Rainproof		3-Pole, NEMA 4X Watertight & Dust-Tight Stainless Steel		3-Pole, NEMA 12 Dust-Tight Industrial External Reset (NEMA 3R) ②	
				Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
0	208	3	120	**ECN0701EAA**	422.	**ECN0702EAA**	505.	**ECN0704EAA**	659.	**ECN0708EAA**	505.
	240	3		**ECN0701BAA**	422.	**ECN0702BAA**	505.	**ECN0704BAA**	659.	**ECN0708BAA**	505.
	480	5		**ECN0701CAA**	422.	**ECN0702CAA**	505.	**ECN0704CAA**	659.	**ECN0708CAA**	505.
	600	5		**ECN0701DAA**	422.	**ECN0702DAA**	505.	**ECN0704DAA**	659.	**ECN0708DAA**	505.
1	208	7-1/2	120	**ECN0711EAA**	455.	**ECN0712EAA**	545.	**ECN0714EAA**	702.	**ECN0718EAA**	545.
	240	7-1/2		**ECN0711BAA**	455.	**ECN0712BAA**	545.	**ECN0714BAA**	702.	**ECN0718BAA**	545.
	480	10		**ECN0711CAA**	455.	**ECN0712CAA**	545.	**ECN0714CAA**	702.	**ECN0718CAA**	545.
	600	10		**ECN0711DAA**	455.	**ECN0712DAA**	545.	**ECN0714DAA**	702.	**ECN0718DAA**	545.
2	208	10	120	**ECN0721EAA**	805.	**ECN0722EAA**	945.	**ECN0724EAA**	1,280.	**ECN0728EAA**	950.
	240	15		**ECN0721BAA**	805.	**ECN0722BAA**	945.	**ECN0724BAA**	1,280.	**ECN0728BAA**	950.
	480	25		**ECN0721CAA**	805.	**ECN0722CAA**	945.	**ECN0724CAA**	1,280.	**ECN0728CAA**	950.
	600	25		**ECN0721DAA**	805.	**ECN0722DAA**	945.	**ECN0724DAA**	1,280.	**ECN0728DAA**	950.
3	208	25	120	**ECN0731EAA**	1,285.	**ECN0732EAA**	1,460.	**ECN0734EAA**	1,960.	**ECN0738EAA**	1,460.
	240	30		**ECN0731BAA**	1,285.	**ECN0732BAA**	1,460.	**ECN0734BAA**	1,960.	**ECN0738BAA**	1,460.
	480	50		**ECN0731CAA**	1,285.	**ECN0732CAA**	1,460.	**ECN0734CAA**	1,960.	**ECN0738CAA**	1,460.
	600	50		**ECN0731DAA**	1,285.	**ECN0732DAA**	1,460.	**ECN0734DAA**	1,960.	**ECN0738DAA**	1,460.
4	208	40	120	**ECN0741EAA**	2,495.	**ECN0742EAA**	3,070.	**ECN0744EAA**	3,655.	**ECN0748EAA**	3,070.
	240	50		**ECN0741BAA**	2,495.	**ECN0742BAA**	3,070.	**ECN0744BAA**	3,655.	**ECN0748BAA**	3,070.
	480	100		**ECN0741CAA**	2,495.	**ECN0742CAA**	3,070.	**ECN0744CAA**	3,655.	**ECN0748CAA**	3,070.
	600	100		**ECN0741DAA**	2,495.	**ECN0742DAA**	3,070.	**ECN0744DAA**	3,655.	**ECN0748DAA**	3,070.
5	208	75	120	**ECN0751EAA**	5,325.	**ECN0752EAA**	5,905.	**ECN0754EAA**	6,795.	**ECN0758EAA**	5,905.
	240	100		**ECN0751BAA**	5,325.	**ECN0752BAA**	5,905.	**ECN0754BAA**	6,795.	**ECN0758BAA**	5,905.
	480	200		**ECN0751CAA**	5,325.	**ECN0752CAA**	5,905.	**ECN0754CAA**	6,795.	**ECN0758CAA**	5,905.
	600	200		**ECN0751DAA**	5,325.	**ECN0752DAA**	5,905.	**ECN0754DAA**	6,795.	**ECN0758DAA**	5,905.
6	208	150	120	**ECN0761EAA**	14,210.	**ECN0762EAA**	16,000.	**ECN0763EAA**	17,540.	**ECN0768EAA**	16,000.
	240	200		**ECN0761BAA**	14,210.	**ECN0762BAA**	16,000.	**ECN0763BAA**	17,540.	**ECN0768BAA**	16,000.
	480	400		**ECN0761CAA**	14,210.	**ECN0762CAA**	16,000.	**ECN0763CAA**	17,540.	**ECN0768CAA**	16,000.
	600	400		**ECN0761DAA**	14,210.	**ECN0762DAA**	16,000.	**ECN0763DAA**	17,540.	**ECN0768DAA**	16,000.
7	240	300	120	**ECN0771BAA**	18,180.	**ECN0772BAA**	20,390.	**ECN0773BAA**	21,420.	**ECN0778BAA**	20,390.
	480	600		**ECN0771CAA**	18,180.	**ECN0772CAA**	20,390.	**ECN0773CAA**	21,420.	**ECN0778CAA**	20,390.
	600	600		**ECN0771DAA**	18,180.	**ECN0772DAA**	20,390.	**ECN0773DAA**	21,420.	**ECN0778DAA**	20,390.
8	240	450	120	**ECN0781BAA**	25,650.	**ECN0782BAA**	27,450.	**ECN0783BAA**	29,950.	**ECN0788BAA**	27,450.
	480	900		**ECN0781CAA**	25,650.	**ECN0782CAA**	27,450.	**ECN0783CAA**	29,950.	**ECN0788CAA**	27,450.
	600	900		**ECN0781DAA**	25,650.	**ECN0782DAA**	27,450.	**ECN0783DAA**	29,950.	**ECN0788DAA**	27,450.
9	240	800	120	**ECN0791BAA**	39,570.	**ECN0792BAA**	41,370.	**ECN0793BAA**	44,050.	**ECN0798BAA**	41,370.
	480	1600		**ECN0791CAA**	39,570.	**ECN0792CAA**	41,370.	**ECN0793CAA**	44,050.	**ECN0798CAA**	41,370.
	600	1600		**ECN0791DAA**	39,570.	**ECN0792DAA**	41,370.	**ECN0793DAA**	44,050.	**ECN0798DAA**	41,370.

Starters do not include heater packs. Select 1 carton of 3 heater packs. For Heater Pack Selection, see **Pages 33-36 – 33-37**.

① Maximum horsepower rating of starters for 380V 50 Hz applications:

NEMA Size	00	0	1	2	3	4	5	6
Horsepower	1-1/2	5	10	25	50	75	150	300

② Suitable for outdoor application when properly installed — see Page i-5 of P.G.3.02.T.E.

③ Other control power transformer primary and/or secondary voltages, see **Page 33-52**.

Note: Reference to *Enclosed Control Product Guide* — PG.3.02.T.E.

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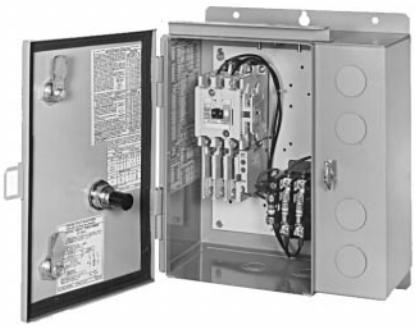

ECN0712CAA

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Discount Symbol **1CD-1C**

Product Selection — Combination Starters with Disconnect Switch

- Full Voltage
- Interchangeable Heater OLR
- 600V Maximum

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Table 33-108. Class ECN16 — NEMA — Fusible Combination Disconnect Switch — Non-reversing

Motor Voltage	Max. hp Rating Dual Element Fuses	Magnet Coil Voltage ①	Fuse Clip Amps.	3-Pole, NEMA 1 General Purpose		3-Pole, NEMA 3R Rainproof		3-Pole, NEMA 4X ⑤ Watertight & Dust-Tight Stainless Steel		3-Pole, NEMA 12 Dust-Tight Industrial External Reset (NEMA 3R) ②③④	
				Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
NEMA Size 0											
200	3	208	30A ⑥	**ECN1601EAB**	635.	**ECN1602EAB**	795.	**ECN1604EAB**	1,275.	**ECN1608EAB**	795.
230	3	240		**ECN1601BAB**	635.	**ECN1602BAB**	795.	**ECN1604BAB**	1,275.	**ECN1608BAB**	795.
460	5	480		**ECN1601CAC**	650.	**ECN1602CAC**	810.	**ECN1604CAC**	1,290.	**ECN1608CAC**	810.
575	5	600		**ECN1601DAC**	650.	**ECN1602DAC**	810.	**ECN1604DAC**	1,290.	**ECN1608DAC**	810.
NEMA Size 1											
200	7-1/2	208	30A ⑥	**ECN1611EAB**	665.	**ECN1612EAB**	825.	**ECN1614EAB**	1,310.	**ECN1618EAB**	825.
230	7-1/2	240		**ECN1611BAB**	665.	**ECN1612BAB**	825.	**ECN1614BAB**	1,310.	**ECN1618BAB**	825.
460	10	480		**ECN1611CAC**	680.	**ECN1612CAC**	840.	**ECN1614CAC**	1,320.	**ECN1618CAC**	840.
575	10	600		**ECN1611DAC**	680.	**ECN1612DAC**	840.	**ECN1614DAC**	1,320.	**ECN1618DAC**	840.
NEMA Size 2											
200	10	208	60A ⑥	**ECN1621EAD**	1,050.	**ECN1622EAD**	1,190.	**ECN1624EAD**	2,035.	**ECN1628EAD**	1,190.
230	15	240		**ECN1621BAD**	1,050.	**ECN1622BAD**	1,190.	**ECN1624BAD**	2,035.	**ECN1628BAD**	1,190.
460	25	480		**ECN1621CAE**	1,070.	**ECN1622CAE**	1,295.	**ECN1624CAE**	2,055.	**ECN1628CAE**	1,295.
575	25	600		**ECN1621DAE**	1,070.	**ECN1622DAE**	1,295.	**ECN1624DAE**	2,055.	**ECN1628DAE**	1,295.
NEMA Size 3											
200	25	208	100A	**ECN1631EAF**	1,760.	**ECN1632EAF**	2,055.	**ECN1634EAF**	3,485.	**ECN1638EAF**	2,055.
230	30	240		**ECN1631BAF**	1,760.	**ECN1632BAF**	2,055.	**ECN1634BAF**	3,485.	**ECN1638BAF**	2,055.
460	50	480		**ECN1631CAG**	1,800.	**ECN1632CAG**	2,090.	**ECN1634CAG**	3,515.	**ECN1638CAG**	2,090.
575	50	600		**ECN1631DAG**	1,800.	**ECN1632DAG**	2,090.	**ECN1634DAG**	3,515.	**ECN1638DAG**	2,090.
NEMA Size 4											
200	40	208	200A	**ECN1641EAH**	3,375.	**ECN1642EAH**	4,190.	**ECN1644EAH**	5,580.	**ECN1648EAH**	4,190.
230	50	240		**ECN1641BAH**	3,375.	**ECN1642BAH**	4,190.	**ECN1644BAH**	5,580.	**ECN1648BAH**	4,190.
460	100	480		**ECN1641CAJ**	3,410.	**ECN1642CAJ**	4,215.	**ECN1644CAJ**	5,610.	**ECN1648CAJ**	4,215.
575	100	600		**ECN1641DAJ**	3,410.	**ECN1642DAJ**	4,215.	**ECN1644DAJ**	5,610.	**ECN1648DAJ**	4,215.

Starters do not include heater packs. Select 1 carton of 3 heater packs. For Heater Pack Selection, see **Pages 33-36 – 33-37**.

① Starters with 120V coil (for separate control) are available. To order, substitute the letter **A** for the 8th character of the listed catalog number.

② Suitable for outdoor application when properly installed — see Page i-5 of P.G.3.02.T.E.

③ All NEMA 12 enclosures are standardized with external reset. For internal reset, order mod code **R5**.

④ NEMA 12 enclosure is without safety door interlock. When safety door interlock is required, change seventh character from 8 to 9, i.e. ECN163**8**EAF becomes ECN163**9**EAF.

⑤ NEMA 4X (Stainless steel) Sizes 0 – 5, NEMA 4 (Painted steel) Sizes 6 – 9.

⑥ Fuse clips are for Class R fuses. For H and J fuses see mods, **Page 33-44**.

Note: Reference to *Enclosed Control Product Guide* — PG.3.02.T.E.

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Discount Symbol **1CD-1C**

Table 33-108. Class ECN16 — NEMA — Fusible Combination Disconnect Switch — Non-reversing (Continued)

Motor Voltage	Max. hp Rating Dual Element Fuses	Magnet Coil Voltage ①	Fuse Clip Amps.	3-Pole, NEMA 1 General Purpose		3-Pole, NEMA 3R Rainproof		3-Pole, NEMA 4X ⑤ Watertight & Dust-Tight Stainless Steel		3-Pole, NEMA 12 Dust-Tight Industrial External Reset (NEMA 3R) ②③④	
				Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
NEMA Size 5											
200	75	208	400A	**ECN1651EAK**	7,560.	**ECN1652EAK**	9,540.	**ECN1654EAK**	13,190.	**ECN1658EAK**	9,540.
230	100	240		**ECN1651BAK**	7,560.	**ECN1652BAK**	9,540.	**ECN1654BAK**	13,190.	**ECN1658BAK**	9,540.
460	200	480		**ECN1651CAL**	7,560.	**ECN1652CAL**	9,540.	**ECN1654CAL**	13,190.	**ECN1658CAL**	9,540.
575	200	600		**ECN1651DAL**	7,560.	**ECN1652DAL**	9,540.	**ECN1654DAL**	13,190.	**ECN1658DAL**	9,540.
NEMA Size 6											
200	150	208	600A	**ECN1661EAM**	20,010.	**ECN1662EAM**	22,310.	**ECN1663EAM**	25,340.	**ECN1668EAM**	22,310.
230	200	240		**ECN1661BAM**	20,010.	**ECN1662BAM**	22,310.	**ECN1663BAM**	25,340.	**ECN1668BAM**	22,310.
460	400	480		**ECN1661CAN**	20,010.	**ECN1662CAN**	22,310.	**ECN1663CAN**	25,340.	**ECN1668CAN**	22,310.
575	400	600		**ECN1661DAN**	20,010.	**ECN1662DAN**	22,310.	**ECN1663DAN**	25,340.	**ECN1668DAN**	22,310.
NEMA Size 7											
230	300	240	⑦	**ECN1671BAU**	30,530.	**ECN1672BAU**	32,330.	**ECN1673BAU**	33,860.	**ECN1678BAU**	32,330.
460	600	480		**ECN1671CAU**	30,530.	**ECN1672CAU**	32,330.	**ECN1673CAU**	33,860.	**ECN1678CAU**	32,330.
575	600	600		**ECN1671DAU**	30,530.	**ECN1672DAU**	32,330.	**ECN1673DAU**	33,860.	**ECN1678DAU**	32,330.
NEMA Size 8											
230	450	240	⑦	**ECN1681BAU**	42,620.	**ECN1682BAU**	44,420.	**ECN1683BAU**	45,960.	**ECN1688BAU**	44,420.
460	900	480		**ECN1681CAU**	42,620.	**ECN1682CAU**	44,420.	**ECN1683CAU**	45,960.	**ECN1688CAU**	44,420.
575	900	600		**ECN1681DAU**	42,620.	**ECN1682DAU**	44,420.	**ECN1683DAU**	45,960.	**ECN1688DAU**	44,420.
NEMA Size 9											
230	800	240	⑦	**ECN1691BAU**	59,540.	**ECN1692BAU**	61,340.	**ECN1693BAU**	62,870.	**ECN1698BAU**	61,340.
460	1000 ⑥	480		**ECN1691CAU**	59,540.	**ECN1692CAU**	61,340.	**ECN1693CAU**	62,870.	**ECN1698CAU**	61,340.
575	1000	600		**ECN1691DAU**	59,540.	**ECN1692DAU**	61,340.	**ECN1693DAU**	62,870.	**ECN1698DAU**	61,340.

Starters do not include heater packs. Select 1 carton of 3 heater packs. For Heater Pack Selection, see **Pages 33-36 – 33-37**.

① Starters with 120V coil (for separate control) are available. To order, substitute the letter **A** for the 8th character of the listed catalog number.

② Suitable for outdoor application when properly installed — see Page i-5 of P.G.3.02.T.E.

③ All NEMA 12 enclosures are standardized with external reset. For internal reset, order mod code **R5**.

④ NEMA 12 enclosure is without safety door interlock. When safety door interlock is required, change seventh character from 8 to 9, i.e. ECN163**8**EAF becomes ECN163**9**EAF.

⑤ NEMA 4X (Stainless steel) Sizes 0 – 5, NEMA 4 (Painted steel) Sizes 6 – 9.

⑥ For 1250 and 1600 hp ratings at 460V, consult Cutler-Hammer.

⑦ Supply hp, voltage, FLA and whether motor is design E or not when ordering the starter.

Note: Reference to *Enclosed Control Product Guide* — PG.3.02.T.E.

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Accessories, Kits Wiring Diagrams Dimensions	11-1 to 11-11 1-77 to 1-85 12-1 to 12-24
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Discount Symbol **1CD-1C**

Table 33-109. Class ECN16 — NEMA — Non-fusible Combination Disconnect Switch⑤ — Non-reversing

Motor Voltage	Max. hp Rating	Magnet Coil Voltage	Dis-connect Amps.	3-Pole, NEMA 1 General Purpose		3-Pole, NEMA 3R Rainproof		3-Pole, NEMA 4X ④ Watertight & Dust-Tight Stainless Steel		3-Pole, NEMA 12 Dust-Tight Industrial External Reset (NEMA 3R) ① ② ③	
				Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
NEMA Size 0											
—	—	120	30A	**ECN1601AAA**	615.	**ECN1602AAA**	775.	**ECN1604AAA**	1,260.	**ECN1608AAA**	775.
200	3	208		**ECN1601EAA**	615.	**ECN1602EAA**	775.	**ECN1604EAA**	1,260.	**ECN1608EAA**	775.
230	3	240		**ECN1601BAA**	615.	**ECN1602BAA**	775.	**ECN1604BAA**	1,260.	**ECN1608BAA**	775.
460	5	480		**ECN1601CAA**	615.	**ECN1602CAA**	775.	**ECN1604CAA**	1,260.	**ECN1608CAA**	775.
575	5	600		**ECN1601DAA**	615.	**ECN1602DAA**	775.	**ECN1604DAA**	1,260.	**ECN1608DAA**	775.
NEMA Size 1											
—	—	120	30A	**ECN1611AAA**	650.	**ECN1612AAA**	810.	**ECN1614AAA**	1,290.	**ECN1618AAA**	810.
200	7-1/2	208		**ECN1611EAA**	650.	**ECN1612EAA**	810.	**ECN1614EAA**	1,290.	**ECN1618EAA**	810.
230	7-1/2	240		**ECN1611BAA**	650.	**ECN1612BAA**	810.	**ECN1614BAA**	1,290.	**ECN1618BAA**	810.
460	10	480		**ECN1611CAA**	650.	**ECN1612CAA**	810.	**ECN1614CAA**	1,290.	**ECN1618CAA**	810.
575	10	600		**ECN1611DAA**	650.	**ECN1612DAA**	810.	**ECN1614DAA**	1,290.	**ECN1618DAA**	810.
NEMA Size 2											
—	—	120	60A	**ECN1621AAA**	1,020.	**ECN1622AAA**	1,245.	**ECN1624AAA**	2,010.	**ECN1628AAA**	1,245.
200	10	208		**ECN1621EAA**	1,020.	**ECN1622EAA**	1,245.	**ECN1624EAA**	2,010.	**ECN1628EAA**	1,245.
230	15	240		**ECN1621BAA**	1,020.	**ECN1622BAA**	1,245.	**ECN1624BAA**	2,010.	**ECN1628BAA**	1,245.
460	25	480		**ECN1621CAA**	1,020.	**ECN1622CAA**	1,245.	**ECN1624CAA**	2,010.	**ECN1628CAA**	1,245.
575	25	600		**ECN1621DAA**	1,020.	**ECN1622DAA**	1,245.	**ECN1624DAA**	2,010.	**ECN1628DAA**	1,245.
NEMA Size 3											
—	—	120	100A	**ECN1631AAA**	1,695.	**ECN1632AAA**	1,990.	**ECN1634AAA**	3,420.	**ECN1638AAA**	1,990.
200	25	208		**ECN1631EAA**	1,695.	**ECN1632EAA**	1,990.	**ECN1634EAA**	3,420.	**ECN1638EAA**	1,990.
230	30	240		**ECN1631BAA**	1,695.	**ECN1632BAA**	1,990.	**ECN1634BAA**	3,420.	**ECN1638BAA**	1,990.
460	50	480		**ECN1631CAA**	1,695.	**ECN1632CAA**	1,990.	**ECN1634CAA**	3,420.	**ECN1638CAA**	1,990.
575	50	600		**ECN1631DAA**	1,695.	**ECN1632DAA**	1,990.	**ECN1634DAA**	3,420.	**ECN1638DAA**	1,990.
NEMA Size 4											
—	—	120	200A	**ECN1641AAA**	3,265.	**ECN1642AAA**	4,075.	**ECN1644AAA**	5,470.	**ECN1648AAA**	4,075.
200	40	208		**ECN1641EAA**	3,265.	**ECN1642EAA**	4,075.	**ECN1644EAA**	5,470.	**ECN1648EAA**	4,075.
230	50	240		**ECN1641BAA**	3,265.	**ECN1642BAA**	4,075.	**ECN1644BAA**	5,470.	**ECN1648BAA**	4,075.
460	100	480		**ECN1641CAA**	3,265.	**ECN1642CAA**	4,075.	**ECN1644CAA**	5,470.	**ECN1648CAA**	4,075.
575	100	600		**ECN1641DAA**	3,265.	**ECN1642DAA**	4,075.	**ECN1644DAA**	5,470.	**ECN1648DAA**	4,075.

Starters do not include heater packs. Select 1 carton of 3 heater packs. For Heater Pack Selection, see **Pages 33-36 – 33-37**.

① Suitable for outdoor application when properly installed — see Page i-5 of P.G.3.02.T.E for details.

② All NEMA 12 enclosures are standardized with external reset. For internal reset, order mod code **R5**.

③ NEMA 12 enclosure is without safety door interlock. When safety door interlock is required, change seventh character from 8 to 9, i.e. ECN163**8**EAA becomes ECN163**9**EAA.

④ NEMA 4X (Stainless steel) Sizes 0 – 5, NEMA 4 (Painted steel) Sizes 6 – 9.

⑤ Field installed Fuse Clips available, see **Page 33-102**.

Note: Reference to *Enclosed Control Product Guide* — PG.3.02.T.E.

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Multi-Speed	1-32, 1-34, 1-36
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Discount Symbol **1CD-1C**

Table 33-108. Class ECN16 — NEMA — Non-fusible Combination Disconnect Switch — Non-reversing (Continued)

Motor Voltage	Max. hp Rating	Magnet Coil Voltage	Disconnect Amps.	3-Pole, NEMA 1 General Purpose		3-Pole, NEMA 3R Rainproof		3-Pole, NEMA 4X ④ Watertight & Dust-Tight Stainless Steel		3-Pole, NEMA 12 Dust-Tight Industrial External Reset (NEMA 3R) ① ② ③	
				Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
NEMA Size 5											
—	—	120	400A	**ECN1651AAA**	7,320.	**ECN1652AAA**	9,300.	**ECN1654AAA**	12,940.	**ECN1658AAA**	9,300.
200	75	208		**ECN1651EAA**	7,320.	**ECN1652EAA**	9,300.	**ECN1654EAA**	12,940.	**ECN1658EAA**	9,300.
230	100	240		**ECN1651BAA**	7,320.	**ECN1652BAA**	9,300.	**ECN1654BAA**	12,940.	**ECN1658BAA**	9,300.
460	200	480		**ECN1651CAA**	7,320.	**ECN1652CAA**	9,300.	**ECN1654CAA**	12,940.	**ECN1658CAA**	9,300.
575	200	600		**ECN1651DAA**	7,320.	**ECN1652DAA**	9,300.	**ECN1654DAA**	12,940.	**ECN1658DAA**	9,300.
NEMA Size 6											
200	150	208	600A	**ECN1661EAA**	19,300.	**ECN1662EAA**	21,600.	**ECN1663EAA**	24,640.	**ECN1668EAA**	21,600.
230	200	240		**ECN1661BAA**	19,300.	**ECN1662BAA**	21,600.	**ECN1663BAA**	24,640.	**ECN1668BAA**	21,600.
460	400	480		**ECN1661CAA**	19,300.	**ECN1662CAA**	21,600.	**ECN1663CAA**	24,640.	**ECN1668CAA**	21,600.
575	400	600		**ECN1661DAA**	19,300.	**ECN1662DAA**	21,600.	**ECN1663DAA**	24,640.	**ECN1668DAA**	21,600.
NEMA Size 7											
230	300	240	⑥	**ECN1671BAA**	24,560.	**ECN1672BAA**	26,360.	**ECN1673BAA**	27,890.	**ECN1678BAA**	26,360.
460	600	480		**ECN1671CAA**	24,560.	**ECN1672CAA**	26,360.	**ECN1673CAA**	27,890.	**ECN1678CAA**	26,360.
575	600	600		**ECN1671DAA**	24,560.	**ECN1672DAA**	26,360.	**ECN1673DAA**	27,890.	**ECN1678DAA**	26,360.
NEMA Size 8											
230	450	240	⑥	**ECN1681BAA**	33,340.	**ECN1682BAA**	35,140.	**ECN1683BAA**	36,690.	**ECN1688BAA**	35,140.
460	900	480		**ECN1681CAA**	33,340.	**ECN1682CAA**	35,140.	**ECN1683CAA**	36,690.	**ECN1688CAA**	35,140.
575	900	600		**ECN1681DAA**	33,340.	**ECN1682DAA**	35,140.	**ECN1683DAA**	36,690.	**ECN1688DAA**	35,140.
NEMA Size 9											
230	800	240	⑥	**ECN1691BAA**	54,030.	**ECN1692BAA**	55,830.	**ECN1693BAA**	57,360.	**ECN1698BAA**	55,830.
460	1000 ⑤	480		**ECN1691CAA**	54,030.	**ECN1692CAA**	55,830.	**ECN1693CAA**	57,360.	**ECN1698CAA**	55,830.
575	1000	600		**ECN1691DAA**	54,030.	**ECN1692DAA**	55,830.	**ECN1693DAA**	57,360.	**ECN1698DAA**	55,830.

Starters do not include heater packs. Select 1 carton of 3 heater packs. For Heater Pack Selection, see **Pages 33-36 – 33-37**.

① Suitable for outdoor application when properly installed — see Page i-5 of P.G.3.02.T.E for details.

② All NEMA 12 enclosures are standardized with external reset. For internal reset, order mod code **R5**.

③ NEMA 12 enclosure is without safety door interlock. When safety door interlock is required, change seventh character from 8 to 9, i.e. ECN163**8**EAA becomes ECN163**9**EAA.

④ NEMA 4X (Stainless steel) Sizes 0 – 5, NEMA 4 (Painted steel) Sizes 6 – 9.

⑤ For 1250 and 1600 hp ratings at 460V, consult Cutler-Hammer.

⑥ Supply hp, voltage, FLA and whether motor is design E or not when ordering the starter.

Note: Reference to *Enclosed Control Product Guide* — PG.3.02.T.E.

Description	Page
Accessories, Kits	11-1 to 11-11
Wiring Diagrams	1-77 to 1-85
Dimensions	12-1 to 12-24
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Discount Symbol **1CD-1C**

Table 33-110. ECN17 — NEMA — Fusible Combination Disconnect Switch — Reversing

Motor Voltage	Max. hp Rating Dual Element Fuses	Magnet Coil Voltage ①	Fuse Clip Amps.	3-Pole, NEMA 1 General Purpose		3-Pole, NEMA 3R Rainproof		3-Pole, NEMA 4X ⑤ Watertight & Dust-Tight Stainless Steel		3-Pole, NEMA 12 Dust-Tight Industrial External Reset (NEMA 3R) ②③④	
				Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
NEMA Size 0											
200	3	208	30A	**ECN1701EAB**	1,020.	**ECN1702EAB**	1,245.	**ECN1704EAB**	1,835.	**ECN1708EAB**	1,245.
230	3	240		**ECN1701BAB**	1,020.	**ECN1702BAB**	1,245.	**ECN1704BAB**	1,835.	**ECN1708BAB**	1,245.
460	5	480		**ECN1701CAC**	1,030.	**ECN1702CAC**	1,265.	**ECN1704CAC**	1,850.	**ECN1708CAC**	1,265.
575	5	600		**ECN1701DAC**	1,030.	**ECN1702DAC**	1,265.	**ECN1704DAC**	1,850.	**ECN1708DAC**	1,265.
NEMA Size 1											
200	7-1/2	208	30A	**ECN1711EAB**	1,090.	**ECN1712EAB**	1,315.	**ECN1714EAB**	1,900.	**ECN1718EAB**	1,315.
230	7-1/2	240		**ECN1711BAB**	1,090.	**ECN1712BAB**	1,315.	**ECN1714BAB**	1,900.	**ECN1718BAB**	1,315.
460	10	480		**ECN1711CAC**	1,105.	**ECN1712CAC**	1,325.	**ECN1714CAC**	1,910.	**ECN1718CAC**	1,325.
575	10	600		**ECN1711DAC**	1,105.	**ECN1712DAC**	1,325.	**ECN1714DAC**	1,910.	**ECN1718DAC**	1,325.
NEMA Size 2											
200	10	208	60A	**ECN1721EAD**	1,810.	**ECN1722EAD**	2,105.	**ECN1724EAD**	3,050.	**ECN1728EAD**	2,105.
230	15	240		**ECN1721BAD**	1,810.	**ECN1722BAD**	2,105.	**ECN1724BAD**	3,050.	**ECN1728BAD**	2,105.
460	25	480		**ECN1721CAE**	1,830.	**ECN1722CAE**	2,120.	**ECN1724CAE**	3,070.	**ECN1728CAE**	2,120.
575	25	600		**ECN1721DAE**	1,830.	**ECN1722DAE**	2,120.	**ECN1724DAE**	3,070.	**ECN1728DAE**	2,120.
NEMA Size 3											
200	25	208	100A	**ECN1731EAF**	3,015.	**ECN1732EAF**	3,410.	**ECN1734EAF**	5,200.	**ECN1738EAF**	3,410.
230	30	240		**ECN1731BAF**	3,015.	**ECN1732BAF**	3,410.	**ECN1734BAF**	5,200.	**ECN1738BAF**	3,410.
460	50	480		**ECN1731CAG**	3,050.	**ECN1732CAG**	3,440.	**ECN1734CAG**	5,230.	**ECN1738CAG**	3,440.
575	50	600		**ECN1731DAG**	3,050.	**ECN1732DAG**	3,440.	**ECN1734DAG**	5,230.	**ECN1738DAG**	3,440.
NEMA Size 4											
200	40	208	200A	**ECN1741EAH**	6,290.	**ECN1742EAH**	7,350.	**ECN1744EAH**	9,040.	**ECN1748EAH**	7,350.
230	50	240		**ECN1741BAH**	6,290.	**ECN1742BAH**	7,350.	**ECN1744BAH**	9,040.	**ECN1748BAH**	7,350.
460	100	480		**ECN1741CAJ**	6,320.	**ECN1742CAJ**	7,370.	**ECN1744CAJ**	9,070.	**ECN1748CAJ**	7,370.
575	100	600		**ECN1741DAJ**	6,320.	**ECN1742DAJ**	7,370.	**ECN1744DAJ**	9,070.	**ECN1748DAJ**	7,370.
NEMA Size 5											
200	75	208	400A	**ECN1751EAK**	12,290.	**ECN1752EAK**	14,810.	**ECN1754EAK**	19,310.	**ECN1758EAK**	14,810.
230	100	240		**ECN1751BAK**	12,290.	**ECN1752BAK**	14,810.	**ECN1754BAK**	19,310.	**ECN1758BAK**	14,810.
460	200	480		**ECN1751CAL**	12,290.	**ECN1752CAL**	14,810.	**ECN1754CAL**	19,310.	**ECN1758CAL**	14,810.
575	200	600		**ECN1751DAL**	12,290.	**ECN1752DAL**	14,810.	**ECN1754DAL**	19,310.	**ECN1758DAL**	14,810.
NEMA Size 6											
200	150	208	600A	**ECN1761EAM**	30,050.	**ECN1762EAM**	31,850.	**ECN1763EAM**	33,380.	**ECN1768EAM**	31,850.
230	200	240		**ECN1761BAM**	30,050.	**ECN1762BAM**	31,850.	**ECN1763BAM**	33,380.	**ECN1768BAM**	31,850.
460	400	480		**ECN1761CAN**	30,050.	**ECN1762CAN**	31,850.	**ECN1763CAN**	33,380.	**ECN1768CAN**	31,850.
575	400	600		**ECN1761DAN**	30,050.	**ECN1762DAN**	31,850.	**ECN1763DAN**	33,380.	**ECN1768DAN**	31,850.
NEMA Size 7											
230	300	240	⑦	**ECN1771BAU**	45,040.	**ECN1772BAU**	46,840.	**ECN1773BAU**	48,380.	**ECN1778BAU**	46,840.
460	600	480		**ECN1771CAU**	45,040.	**ECN1772CAU**	46,840.	**ECN1773CAU**	48,380.	**ECN1778CAU**	46,840.
575	600	600		**ECN1771DAU**	45,040.	**ECN1772DAU**	46,840.	**ECN1773DAU**	48,380.	**ECN1778DAU**	46,840.
NEMA Size 8											
230	450	240	⑦	**ECN1781BAU**	67,150.	**ECN1782BAU**	68,890.	**ECN1783BAU**	70,490.	**ECN1788BAU**	68,890.
460	900	480		**ECN1781CAU**	67,150.	**ECN1782CAU**	68,890.	**ECN1783CAU**	70,490.	**ECN1788CAU**	68,890.
575	900	600		**ECN1781DAU**	67,150.	**ECN1782DAU**	68,890.	**ECN1783DAU**	70,490.	**ECN1788DAU**	68,890.
NEMA Size 9											
230	800	240	⑦	**ECN1791BAU**	92,490.	**ECN1792BAU**	94,290.	**ECN1793BAU**	95,830.	**ECN1798BAU**	94,290.
460	1000 ⑥	480		**ECN1791CAU**	92,490.	**ECN1792CAU**	94,290.	**ECN1793CAU**	95,830.	**ECN1798CAU**	94,290.
575	1000	600		**ECN1791DAU**	92,490.	**ECN1792DAU**	94,290.	**ECN1793DAU**	95,830.	**ECN1798DAU**	94,290.

Starters do not include heater packs. Select 1 carton of 3 heater packs. For Heater Pack Selection, see **Pages 33-36 – 33-37**.

① Starters with 120V coil (for separate control) are available.To order, substitute the letter **A** for the 8th character of the listed catalog number.

② Suitable for outdoor application when properly installed — see Page i-5 of P.G.3.02.T.E.

③ All NEMA 12 enclosures are standardized with external reset. For internal reset, order mod code **R5**.

④ NEMA 12 enclosure is without safety door interlock. When safety door interlock is required, change seventh character from 8 to 9, i.e. ECN173**8**EAF becomes ECN173**9**EAF.

⑤ NEMA 4X (Stainless steel) Sizes 0 – 5, NEMA 4 (Painted steel) Sizes 6 – 9.

⑥ For 1250 and 1600 hp ratings at 460V, consult Cutler-Hammer.

⑦ Supply hp, voltage, FLA and whether motor is design E or not when ordering the starter.

Note: Reference to *Enclosed Control Product Guide* — PG.3.02.T.E.

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Discount Symbol **1CD-1C**

Table 33-111. Class ECN17 — NEMA — Non-fusible Combination Disconnect Switch — Reversing

Motor Voltage	Max. hp Rating	Magnet Coil Voltage	Disconnect Amps.	3-Pole, NEMA 1 General Purpose		3-Pole, NEMA 3R Rainproof		3-Pole, NEMA 4X ④ Watertight & Dust-Tight Stainless Steel		3-Pole, NEMA 12 Dust-Tight Industrial External Reset (NEMA 3R) ①②③	
				Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
NEMA Size 0											
—	—	120	30A	**ECN1701AAA**	1,000.	**ECN1702AAA**	1,230.	**ECN1704AAA**	1,820.	**ECN1708AAA**	1,230.
200	3	208		**ECN1701EAA**	1,000.	**ECN1702EAA**	1,230.	**ECN1704EAA**	1,820.	**ECN1708EAA**	1,230.
230	3	240		**ECN1701BAA**	1,000.	**ECN1702BAA**	1,230.	**ECN1704BAA**	1,820.	**ECN1708BAA**	1,230.
460	5	480		**ECN1701CAA**	1,000.	**ECN1702CAA**	1,230.	**ECN1704CAA**	1,820.	**ECN1708CAA**	1,230.
575	5	600		**ECN1701DAA**	1,000.	**ECN1702DAA**	1,230.	**ECN1704DAA**	1,820.	**ECN1708DAA**	1,230.
NEMA Size 1											
—	—	120	30A	**ECN1711AAA**	1,070.	**ECN1712AAA**	1,295.	**ECN1714AAA**	1,880.	**ECN1718AAA**	1,295.
200	7-1/2	208		**ECN1711EAA**	1,070.	**ECN1712EAA**	1,295.	**ECN1714EAA**	1,880.	**ECN1718EAA**	1,295.
230	7-1/2	240		**ECN1711BAA**	1,070.	**ECN1712BAA**	1,295.	**ECN1714BAA**	1,880.	**ECN1718BAA**	1,295.
460	10	480		**ECN1711CAA**	1,070.	**ECN1712CAA**	1,295.	**ECN1714CAA**	1,880.	**ECN1718CAA**	1,295.
575	10	600		**ECN1711DAA**	1,070.	**ECN1712DAA**	1,295.	**ECN1714DAA**	1,880.	**ECN1718DAA**	1,295.
NEMA Size 2											
—	—	120	60A	**ECN1721AAA**	1,780.	**ECN1722AAA**	2,070.	**ECN1724AAA**	3,020.	**ECN1728AAA**	2,070.
200	10	208		**ECN1721EAA**	1,780.	**ECN1722EAA**	2,070.	**ECN1724EAA**	3,020.	**ECN1728EAA**	2,070.
230	15	240		**ECN1721BAA**	1,780.	**ECN1722BAA**	2,070.	**ECN1724BAA**	3,020.	**ECN1728BAA**	2,070.
460	25	480		**ECN1721CAA**	1,780.	**ECN1722CAA**	2,070.	**ECN1724CAA**	3,020.	**ECN1728CAA**	2,070.
575	25	600		**ECN1721DAA**	1,780.	**ECN1722DAA**	2,070.	**ECN1724DAA**	3,020.	**ECN1728DAA**	2,070.
NEMA Size 3											
—	—	120	100A	**ECN1731AAA**	2,745.	**ECN1732AAA**	3,335.	**ECN1734AAA**	5,120.	**ECN1738AAA**	3,335.
200	25	208		**ECN1731EAA**	2,745.	**ECN1732EAA**	3,335.	**ECN1734EAA**	5,120.	**ECN1738EAA**	3,335.
230	30	240		**ECN1731BAA**	2,745.	**ECN1732BAA**	3,335.	**ECN1734BAA**	5,120.	**ECN1738BAA**	3,335.
460	50	480		**ECN1731CAA**	2,745.	**ECN1732CAA**	3,335.	**ECN1734CAA**	5,120.	**ECN1738CAA**	3,335.
575	50	600		**ECN1731DAA**	2,745.	**ECN1732DAA**	3,335.	**ECN1734DAA**	5,120.	**ECN1738DAA**	3,335.
NEMA Size 4											
—	—	120	200A	**ECN1741AAA**	6,180.	**ECN1742AAA**	7,240.	**ECN1744AAA**	8,940.	**ECN1748AAA**	7,240.
200	40	208		**ECN1741EAA**	6,180.	**ECN1742EAA**	7,240.	**ECN1744EAA**	8,940.	**ECN1748EAA**	7,240.
230	50	240		**ECN1741BAA**	6,180.	**ECN1742BAA**	7,240.	**ECN1744BAA**	8,940.	**ECN1748BAA**	7,240.
460	100	480		**ECN1741CAA**	6,180.	**ECN1742CAA**	7,240.	**ECN1744CAA**	8,940.	**ECN1748CAA**	7,240.
575	100	600		**ECN1741DAA**	6,180.	**ECN1742DAA**	7,240.	**ECN1744DAA**	8,940.	**ECN1748DAA**	7,240.

Starters do not include heater packs. Select 1 carton of 3 heater packs. For Heater Pack Selection, see **Pages 33-36 – 33-37**.

① Suitable for outdoor application when properly installed — see Page i-5 of P.G.3.02.T.E.

② All NEMA 12 enclosures are standardized with external reset. For internal reset, order mod code **R5**.

③ NEMA 12 enclosure is without safety door interlock. When safety door interlock is required, change seventh character from 8 to 9, i.e. ECN173**8**EAA becomes ECN173**9**EAA.

④ NEMA 4X (Stainless steel) Sizes 0 – 5, NEMA 4 (Painted steel) Sizes 6 – 9.

Note: Reference to *Enclosed Control Product Guide* — PG.3.02.T.E.

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Discount Symbol **1CD-1C**

Table 33-111. Class ECN17 — NEMA — Non-fusible Combination Disconnect Switch — Reversing (Continued)

Motor Voltage	Max. hp Rating	Magnet Coil Voltage	Dis-connect Amps.	3-Pole, NEMA 1 General Purpose		3-Pole, NEMA 3R Rainproof		3-Pole, NEMA 4X ④ Watertight & Dust-Tight Stainless Steel		3-Pole, NEMA 12 Dust-Tight Industrial External Reset (NEMA 3R) ①②③	
				Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
NEMA Size 5											
—	—	120	400A	**ECN1751AAA**	12,040.	**ECN1752AAA**	14,570.	**ECN1754AAA**	19,060.	**ECN1758AAA**	14,570.
200	75	208		**ECN1751EAA**	12,040.	**ECN1752EAA**	14,570.	**ECN1754EAA**	19,060.	**ECN1758EAA**	14,570.
230	100	240		**ECN1751BAA**	12,040.	**ECN1752BAA**	14,570.	**ECN1754BAA**	19,060.	**ECN1758BAA**	14,570.
460	200	480		**ECN1751CAA**	12,040.	**ECN1752CAA**	14,570.	**ECN1754CAA**	19,060.	**ECN1758CAA**	14,570.
575	200	600		**ECN1751DAA**	12,040.	**ECN1752DAA**	14,570.	**ECN1754DAA**	19,060.	**ECN1758DAA**	14,570.
NEMA Size 6											
200	150	208	600A	**ECN1761EAA**	29,350.	**ECN1762EAA**	31,150.	**ECN1763EAA**	32,680.	**ECN1768EAA**	31,150.
230	200	240		**ECN1761BAA**	29,350.	**ECN1762BAA**	31,150.	**ECN1763BAA**	32,680.	**ECN1768BAA**	31,150.
460	400	480		**ECN1761CAA**	29,350.	**ECN1762CAA**	31,150.	**ECN1763CAA**	32,680.	**ECN1768CAA**	31,150.
575	400	600		**ECN1761DAA**	29,350.	**ECN1762DAA**	31,150.	**ECN1763DAA**	32,680.	**ECN1768DAA**	31,150.
NEMA Size 7											
230	300	240	⑥	**ECN1771BAA**	38,600.	**ECN1772BAA**	40,400.	**ECN1773BAA**	41,930.	**ECN1778BAA**	40,400.
460	600	480		**ECN1771CAA**	38,600.	**ECN1772CAA**	40,400.	**ECN1773CAA**	41,930.	**ECN1778CAA**	40,400.
575	600	600		**ECN1771DAA**	38,600.	**ECN1772DAA**	40,400.	**ECN1773DAA**	41,930.	**ECN1778DAA**	40,400.
NEMA Size 8											
230	450	240	⑥	**ECN1781BAA**	53,920.	**ECN1782BAA**	55,720.	**ECN1783BAA**	57,260.	**ECN1788BAA**	55,720.
460	900	480		**ECN1781CAA**	53,920.	**ECN1782CAA**	55,720.	**ECN1783CAA**	57,260.	**ECN1788CAA**	55,720.
575	900	600		**ECN1781DAA**	53,920.	**ECN1782DAA**	55,720.	**ECN1783DAA**	57,260.	**ECN1788DAA**	55,720.
NEMA Size 9											
230	800	240	⑥	**ECN1791BAA**	86,010.	**ECN1792BAA**	87,810.	**ECN1793BAA**	89,350.	**ECN1798BAA**	87,810.
460	1000 ⑤	480		**ECN1791CAA**	86,010.	**ECN1792CAA**	87,810.	**ECN1793CAA**	89,350.	**ECN1798CAA**	87,810.
575	1000	600		**ECN1791DAA**	86,010.	**ECN1792DAA**	87,810.	**ECN1793DAA**	89,350.	**ECN1798DAA**	87,810.

Starters do not include heater packs. Select 1 carton of 3 heater packs. For Heater Pack Selection, see **Pages 33-36 – 33-37**.

① Suitable for outdoor application when properly installed — see Page i-5 of P.G.3.02.T.E.

② All NEMA 12 enclosures are standardized with external reset. For internal reset, order mod code **R5**.

③ NEMA 12 enclosure is without safety door interlock. When safety door interlock is required, change seventh character from 8 to 9, i.e. ECN173**8**EAA becomes ECN173**9**EAA.

④ NEMA 4X (Stainless steel) Sizes 0 – 5, NEMA 4 (Painted steel) Sizes 6 – 9.

⑤ For 1250 and 1600 hp ratings at 460V, consult Cutler-Hammer.

⑥ Supply hp, voltage, FLA and whether motor is design E or not when ordering the starter.

Note: Reference to *Enclosed Control Product Guide* — PG.3.02.T.E.

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Discount Symbol **1CD-1C**

Table 33-112. Class ECN18 — NEMA — Fusible Combination Disconnect Switch with CPT — Non-reversing

Primary Voltage ①	Max. hp Rating	Magnet Coil Voltage	Fuse Clip Amps.	3-Pole, NEMA 1 General Purpose		3-Pole, NEMA 3R Rainproof		3-Pole, NEMA 4X Watertight & Dust-Tight Stainless Steel ⑥		3-Pole, NEMA 12 Dust-Tight Industrial External Reset (NEMA 3R) ②③④	
				Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
NEMA Size 0											
208	3	120	30A ⑤	**ECN1801EAB**	817.	**ECN1802EAB**	977.	**ECN1804EAB**	1,457.	**ECN1808EAB**	977.
240	3			**ECN1801BAB**	817.	**ECN1802BAB**	977.	**ECN1804BAB**	1,457.	**ECN1808BAB**	977.
480	5			**ECN1801CAC**	832.	**ECN1802CAC**	992.	**ECN1804CAC**	1,472.	**ECN1808CAC**	992.
600	5			**ECN1801DAC**	832.	**ECN1802DAC**	992.	**ECN1804DAC**	1,472.	**ECN1808DAC**	992.
NEMA Size 1											
208	7-1/2	120	30A ⑤	**ECN1811EAB**	847.	**ECN1812EAB**	1,007.	**ECN1814EAB**	1,492.	**ECN1818EAB**	1,007.
240	7-1/2			**ECN1811BAB**	847.	**ECN1812BAB**	1,007.	**ECN1814BAB**	1,492.	**ECN1818BAB**	1,007.
480	10			**ECN1811CAC**	862.	**ECN1812CAC**	1,022.	**ECN1814CAC**	1,502.	**ECN1818CAC**	1,022.
600	10			**ECN1811DAC**	862.	**ECN1812DAC**	1,022.	**ECN1814DAC**	1,502.	**ECN1818DAC**	1,022.
NEMA Size 2											
208	10	120	60A ⑤	**ECN1821EAD**	1,305.	**ECN1822EAD**	1,445.	**ECN1824EAD**	2,290.	**ECN1828EAD**	1,445.
240	15			**ECN1821BAD**	1,305.	**ECN1822BAD**	1,445.	**ECN1824BAD**	2,290.	**ECN1828BAD**	1,445.
480	25			**ECN1821CAE**	1,325.	**ECN1822CAE**	1,550.	**ECN1824CAE**	2,310.	**ECN1828CAE**	1,550.
600	25			**ECN1821DAE**	1,325.	**ECN1822DAE**	1,550.	**ECN1824DAE**	2,310.	**ECN1828DAE**	1,550.
NEMA Size 3											
208	25	120	100A	**ECN1831EAF**	2,135.	**ECN1832EAF**	2,430.	**ECN1834EAF**	3,860.	**ECN1838EAF**	2,430.
240	30			**ECN1831BAF**	2,135.	**ECN1832BAF**	2,430.	**ECN1834BAF**	3,860.	**ECN1838BAF**	2,430.
480	50			**ECN1831CAG**	2,175.	**ECN1832CAG**	2,465.	**ECN1834CAG**	3,890.	**ECN1838CAG**	2,465.
600	50			**ECN1831DAG**	2,175.	**ECN1832DAG**	2,465.	**ECN1834DAG**	3,890.	**ECN1838DAG**	2,465.
NEMA Size 4											
208	40	120	200A	**ECN1841EAH**	3,830.	**ECN1842EAH**	4,645.	**ECN1844EAH**	6,035.	**ECN1848EAH**	4,645.
240	50			**ECN1841BAH**	3,830.	**ECN1842BAH**	4,645.	**ECN1844BAH**	6,035.	**ECN1848BAH**	4,645.
480	100			**ECN1841CAJ**	3,865.	**ECN1842CAJ**	4,670.	**ECN1844CAJ**	6,065.	**ECN1848CAJ**	4,670.
600	100			**ECN1841DAJ**	3,865.	**ECN1842DAJ**	4,670.	**ECN1844DAJ**	6,065.	**ECN1848DAJ**	4,670.
NEMA Size 5 ⑦											
208	75	120	400A	**ECN1851EAK**	8,075.	**ECN1852EAK**	10,055.	**ECN1854EAK**	13,705.	**ECN1858EAK**	10,055.
240	100			**ECN1851BAK**	8,075.	**ECN1852BAK**	10,055.	**ECN1854BAK**	13,705.	**ECN1858BAK**	10,055.
480	200			**ECN1851CAL**	8,075.	**ECN1852CAL**	10,055.	**ECN1854CAL**	13,705.	**ECN1858CAL**	10,055.
600	200			**ECN1851DAL**	8,075.	**ECN1852DAL**	10,055.	**ECN1854DAL**	13,705.	**ECN1858DAL**	10,055.

Starters do not include heater packs. Select 1 carton of 3 heater packs. For Heater Pack Selection, see **Pages 33-36 – 33-37**.

① Other control power transformer primary and/or secondary voltages, see **Page 33-52**.

② Suitable for outdoor application when properly installed — see Page i-5 of P.G.3.02.T.E.

③ All NEMA 12 enclosures are standardized with external reset. For internal reset, order mod code **R5**.

④ NEMA 12 enclosure is without safety door interlock. When safety door interlock is required, change seventh character from 8 to 9, i.e. ECN183**8**EAF becomes ECN183**9**EAF.

⑤ Fuse clips are for Class R fuses. For H and J fuses see mods, **Page 33-44**.

⑥ NEMA 4X (Stainless steel) Sizes 0 – 5, NEMA 4 (Painted steel) Sizes 6 – 9.

⑦ NEMA Sizes 6 – 9 are available. See PG.3.02.T.E.

Note: Reference to *Enclosed Control Product Guide* — PG.3.02.T.E.

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Discount Symbol **1CD-1C**

Table 33-113. Class ECN18 — NEMA — Non-fusible Combination Disconnect Switch with CPT — Non-reversing

Primary Voltage ①	Max. hp Rating	Magnet Coil Voltage	Disconnect Switch Rating	3-Pole, NEMA 1 General Purpose		3-Pole, NEMA 3R Rainproof		3-Pole, NEMA 4X Watertight & Dust-Tight Stainless Steel ⑤		3-Pole, NEMA 12 Dust-Tight Industrial External Reset (NEMA 3R) ② ③ ④	
				Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
NEMA Size 0											
208	3	120	30A	**ECN1801EAA**	795.	**ECN1802EAA**	955.	**ECN1804EAA**	1,435.	**ECN1808EAA**	955.
240	3			**ECN1801BAA**	795.	**ECN1802BAA**	955.	**ECN1804BAA**	1,435.	**ECN1808BAA**	955.
480	5			**ECN1801CAA**	795.	**ECN1802CAA**	955.	**ECN1804CAA**	1,435.	**ECN1808CAA**	955.
600	5			**ECN1801DAA**	795.	**ECN1802DAA**	955.	**ECN1804DAA**	1,435.	**ECN1808DAA**	955.
NEMA Size 1											
208	7-1/2	120	30A	**ECN1811EAA**	825.	**ECN1812EAA**	985.	**ECN1814EAA**	1,470.	**ECN1818EAA**	985.
240	7-1/2			**ECN1811BAA**	825.	**ECN1812BAA**	985.	**ECN1814BAA**	1,470.	**ECN1818BAA**	985.
480	10			**ECN1811CAA**	825.	**ECN1812CAA**	985.	**ECN1814CAA**	1,470.	**ECN1818CAA**	985.
600	10			**ECN1811DAA**	825.	**ECN1812DAA**	985.	**ECN1814DAA**	1,470.	**ECN1818DAA**	985.
NEMA Size 2											
208	10	120	60A	**ECN1821EAA**	1,275.	**ECN1822EAA**	1,505.	**ECN1824EAA**	2,260.	**ECN1828EAA**	1,505.
240	15			**ECN1821BAA**	1,275.	**ECN1822BAA**	1,505.	**ECN1824BAA**	2,260.	**ECN1828BAA**	1,505.
480	25			**ECN1821CAA**	1,275.	**ECN1822CAA**	1,505.	**ECN1824CAA**	2,260.	**ECN1828CAA**	1,505.
600	25			**ECN1821DAA**	1,275.	**ECN1822DAA**	1,505.	**ECN1824DAA**	2,260.	**ECN1828DAA**	1,505.
NEMA Size 3											
208	25	120	100A	**ECN1831EAA**	2,065.	**ECN1832EAA**	2,360.	**ECN1834EAA**	3,790.	**ECN1838EAA**	2,360.
240	30			**ECN1831BAA**	2,065.	**ECN1832BAA**	2,360.	**ECN1834BAA**	3,790.	**ECN1838BAA**	2,360.
480	50			**ECN1831CAA**	2,065.	**ECN1832CAA**	2,360.	**ECN1834CAA**	3,790.	**ECN1838CAA**	2,360.
600	50			**ECN1831DAA**	2,065.	**ECN1832DAA**	2,360.	**ECN1834DAA**	3,790.	**ECN1838DAA**	2,360.
NEMA Size 4											
208	40	120	200A	**ECN1841EAA**	3,715.	**ECN1842EAA**	4,530.	**ECN1844EAA**	5,925.	**ECN1848EAA**	4,530.
240	50			**ECN1841BAA**	3,715.	**ECN1842BAA**	4,530.	**ECN1844BAA**	5,925.	**ECN1848BAA**	4,530.
480	100			**ECN1841CAA**	3,715.	**ECN1842CAA**	4,530.	**ECN1844CAA**	5,925.	**ECN1848CAA**	4,530.
600	100			**ECN1841DAA**	3,715.	**ECN1842DAA**	4,530.	**ECN1844DAA**	5,925.	**ECN1848DAA**	4,530.
NEMA Size 5 ⑥											
208	75	120	400A	**ECN1851EAA**	7,835.	**ECN1852EAA**	9,815.	**ECN1854EAA**	13,705.	**ECN1858EAA**	9,815.
240	100			**ECN1851BAA**	7,835.	**ECN1852BAA**	9,815.	**ECN1854BAA**	13,705.	**ECN1858BAA**	9,815.
480	200			**ECN1851CAA**	7,835.	**ECN1852CAA**	9,815.	**ECN1854CAA**	13,705.	**ECN1858CAA**	9,815.
600	200			**ECN1851DAA**	7,835.	**ECN1852DAA**	9,815.	**ECN1854DAA**	13,705.	**ECN1858DAA**	9,815.

Starters do not include heater packs. Select 1 carton of 3 heater packs. For Heater Pack Selection, see **Pages 33-36 – 33-37**.

① Other control power transformer primary and/or secondary voltages, see **Page 33-52**.

② Suitable for outdoor application when properly installed — see Page i-5 of P.G.3.02.T.E.

③ All NEMA 12 enclosures are standardized with external reset. For internal reset, order mod code **R5**.

④ NEMA 12 enclosure is without safety door interlock. When safety door interlock is required, change seventh character from 8 to 9, i.e. ECN183**8**EAF becomes ECN183**9**EAF.

⑤ NEMA 4X (Stainless steel) Sizes 0 – 5, NEMA 4 (Painted steel) Sizes 6 – 9.

⑥ NEMA Sizes 6 – 9 are available. See PG.3.02.T.E.

Note: Reference to *Enclosed Control Product Guide* — PG.3.02.T.E.

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Discount Symbol **1CD-1C**

Product Selection — Combination Starters with HMCP/E

- Full Voltage
- Interchangeable Heater OLR
- 600V Maximum

Table 33-114. Class ECN22 — NEMA — Combination HMCP — Non-reversing

Motor Voltage	Max. hp Rating	Magnet Coil Voltage ①	Circuit Breaker Type	3-Pole, NEMA 1 General Purpose		3-Pole, NEMA 3R Rainproof		3-Pole, NEMA 4X Watertight & Dust-Tight Stainless Steel		3-Pole, NEMA 12 Dust-Tight Industrial External Reset (NEMA 3R) ②③④	
				Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
NEMA Size 0											
200	1 2	208	HMCPE 7A HMCPE 15A	**ECN2201EAC** **ECN2201EAD**	850. 850.	**ECN2202EAC** **ECN2202EAD**	1,010. 1,010.	**ECN2204EAC** **ECN2204EAD**	1,500. 1,500.	**ECN2208EAC** **ECN2208EAD**	1,010. 1,010.
230	1 3	240	HMCPE 7A HMCPE 15A	**ECN2201BAC** **ECN2201BAD**	850. 850.	**ECN2202BAC** **ECN2202BAD**	1,010. 1,010.	**ECN2204BAC** **ECN2204BAD**	1,500. 1,500.	**ECN2208BAC** **ECN2208BAD**	1,010. 1,010.
460	3/4 2 5	480	HMCPE 3A HMCPE 7A HMCPE 15A	**ECN2201CAB** **ECN2201CAC** **ECN2201CAD**	850. 850. 850.	**ECN2202CAB** **ECN2202CAC** **ECN2202CAD**	1,010. 1,010. 1,010.	**ECN2204CAB** **ECN2204CAC** **ECN2204CAD**	1,500. 1,500. 1,500.	**ECN2208CAB** **ECN2208CAC** **ECN2208CAD**	1,010. 1,010. 1,010.
575	1 3 5	600	HMCP 3A HMCP 7A HMCP 15A	**ECN2201DA5** **ECN2201DA6** **ECN2201DA7**	850. 850. 850.	**ECN2202DA5** **ECN2202DA6** **ECN2202DA7**	1,010. 1,010. 1,010.	**ECN2204DA5** **ECN2204DA6** **ECN2204DA7**	1,500. 1,500. 1,500.	**ECN2208DA5** **ECN2208DA6** **ECN2208DA7**	1,010. 1,010. 1,010.
NEMA Size 1											
200	1 2 7-1/2	208	HMCPE 7A HMCPE 15A HMCPE 30A	**ECN2211EAC** **ECN2211EAD** **ECN2211EAE**	885. 885. 885.	**ECN2212EAC** **ECN2212EAD** **ECN2212EAE**	1,050. 1,050. 1,050.	**ECN2214EAC** **ECN2214EAD** **ECN2214EAE**	1,530. 1,530. 1,530.	**ECN2218EAC** **ECN2218EAD** **ECN2218EAE**	1,050. 1,050. 1,050.
230	1 2 7-1/2	240	HMCPE 7A HMCPE 15A HMCPE 30A	**ECN2211BAC** **ECN2211BAD** **ECN2211BAE**	885. 885. 885.	**ECN2212BAC** **ECN2212BAD** **ECN2212BAE**	1,050. 1,050. 1,050.	**ECN2214BAC** **ECN2214BAD** **ECN2214BAE**	1,530. 1,530. 1,530.	**ECN2218BAC** **ECN2218BAD** **ECN2218BAE**	1,050. 1,050. 1,050.
460	3/4 2 5 10	480	HMCPE 3A HMCPE 7A HMCPE 15A HMCPE 30A	**ECN2211CAB** **ECN2211CAC** **ECN2211CAD** **ECN2211CAE**	885. 885. 885. 885.	**ECN2212CAB** **ECN2212CAC** **ECN2212CAD** **ECN2212CAE**	1,050. 1,050. 1,050. 1,050.	**ECN2214CAB** **ECN2214CAC** **ECN2214CAD** **ECN2214CAE**	1,530. 1,530. 1,530. 1,530.	**ECN2218CAB** **ECN2218CAC** **ECN2218CAD** **ECN2218CAE**	1,050. 1,050. 1,050. 1,050.
575	1 3 7-1/2 10	600	HMCP 3A HMCP 7A HMCP 15A HMCP 30A	**ECN2211DA5** **ECN2211DA6** **ECN2211DA7** **ECN2211DA8**	885. 885. 885. 885.	**ECN2212DA5** **ECN2212DA6** **ECN2212DA7** **ECN2212DA8**	1,050. 1,050. 1,050. 1,050.	**ECN2214DA5** **ECN2214DA6** **ECN2214DA7** **ECN2214DA8**	1,530. 1,530. 1,530. 1,530.	**ECN2218DA5** **ECN2218DA6** **ECN2218DA7** **ECN2218DA8**	1,050. 1,050. 1,050. 1,050.

Starters do not include heater packs. Select 1 carton of 3 heater packs. For Heater Pack Selection, see **Pages 33-36 – 33-37**.

① Starters with 120V coil (for separate control) are available. To order, substitute the letter **A** for the 8th character of the listed catalog number.

② Suitable for outdoor application when properly installed — see Page i-5 of P.G.3.02.T.E.

③ All NEMA 12 enclosures are standardized with external reset. For internal reset, order mod code **R5**.

④ NEMA 12 enclosure is without safety door interlock. When safety door interlock is required, change seventh character from 8 to 9, i.e. ECN223**8**EAG becomes ECN223**9**EAG.

Note: Reference to *Enclosed Control Product Guide* — PG.3.02.T.E.

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Discount Symbol **1CD-1C**

Table 33-114. Class ECN22 — NEMA — Combination HMCP/E — Non-reversing (Continued)

Motor Voltage	Max. hp Rating	Magnet Coil Voltage ①	Circuit Breaker Type	3-Pole, NEMA 1 General Purpose		3-Pole, NEMA 3R Rainproof		3-Pole, NEMA 4X Watertight & Dust-Tight Stainless Steel		3-Pole, NEMA 12 Dust-Tight Industrial External Reset (NEMA 3R) ②③④	
				Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
NEMA Size 2											
200	10	208	HMCPE 50A	**ECN2221EAF**	1,260.	**ECN2222EAF**	1,485.	**ECN2224EAF**	2,245.	**ECN2228EAF**	1,485.
230	15	240	HMCPE 50A	**ECN2221BAF**	1,260.	**ECN2222BAF**	1,485.	**ECN2224BAF**	2,245.	**ECN2228BAF**	1,485.
460	25	480	HMCPE 50A	**ECN2221CAF**	1,260.	**ECN2222CAF**	1,485.	**ECN2224CAF**	2,245.	**ECN2228CAF**	1,485.
575	25	600	HMCP 100A	**ECN2221DA9**	1,260.	**ECN2222DA9**	1,485.	**ECN2224DA9**	2,245.	**ECN2228DA9**	1,485.
NEMA Size 3											
200	25	208	HMCPE 100A	**ECN2231EAG**	1,825.	**ECN2232EAG**	2,115.	**ECN2234EAG**	3,540.	**ECN2238EAG**	2,115.
230	30	240	HMCPE 100A	**ECN2231BAG**	1,825.	**ECN2232BAG**	2,115.	**ECN2234BAG**	3,540.	**ECN2238BAG**	2,115.
460	50	480	HMCPE 100A	**ECN2231CAG**	1,825.	**ECN2232CAG**	2,115.	**ECN2234CAG**	3,540.	**ECN2238CAG**	2,115.
575	50	600	HMCP 100A	**ECN2231DAI**	1,825.	**ECN2232DAI**	2,115.	**ECN2234DAI**	3,540.	**ECN2238DAI**	2,115.
NEMA Size 4											
200	40	208	HMCP 150A	**ECN2241EAH**	4,445.	**ECN2242EAH**	4,800.	**ECN2244EAH**	6,200.	**ECN2248EAH**	4,800.
230	50	240	HMCP 150A	**ECN2241BAH**	4,445.	**ECN2242BAH**	4,800.	**ECN2244BAH**	6,200.	**ECN2248BAH**	4,800.
460	100	480	HMCP 150A	**ECN2241CAH**	4,445.	**ECN2242CAH**	4,800.	**ECN2244CAH**	6,200.	**ECN2248CAH**	4,800.
575	100	600	HMCP 150A	**ECN2241DAH**	4,445.	**ECN2242DAH**	4,800.	**ECN2244DAH**	6,200.	**ECN2248DAH**	4,800.
NEMA Size 5											
200	60	208	HMCP 250A	**ECN2251EAJ**	9,260.	**ECN2252EAJ**	10,730.	**ECN2254EAJ**	14,870.	**ECN2258EAJ**	10,730.
	75		HMCP 400A	**ECN2251EAK**	9,260.	**ECN2252EAK**	10,730.	**ECN2254EAK**	14,870.	**ECN2258EAK**	10,730.
230	75	240	HMCP 250A	**ECN2251BAJ**	9,260.	**ECN2252BAJ**	10,730.	**ECN2254BAJ**	14,870.	**ECN2258BAJ**	10,730.
	100		HMCP 400A	**ECN2251BAK**	9,260.	**ECN2252BAK**	10,730.	**ECN2254BAK**	14,870.	**ECN2258BAK**	10,730.
460	150	480	HMCP 250A	**ECN2251CAJ**	9,260.	**ECN2252CAJ**	10,730.	**ECN2254CAJ**	14,870.	**ECN2258CAJ**	10,730.
	200		HMCP 400A	**ECN2251CAK**	9,260.	**ECN2252CAK**	10,730.	**ECN2254CAK**	14,870.	**ECN2258CAK**	10,730.
575	200	600	HMCP 250A	**ECN2251DAJ**	9,260.	**ECN2252DAJ**	10,730.	**ECN2254DAJ**	14,870.	**ECN2258DAJ**	10,730.

Starters do not include heater packs. Select 1 carton of 3 heater packs. For Heater Pack Selection, see **Pages 33-36 – 33-37**.

① Starters with 120V coil (for separate control) are available. To order, substitute the letter **A** for the 8th character of the listed catalog number.

② Suitable for outdoor application when properly installed — see Page i-5 of P.G.3.02.T.E.

③ All NEMA 12 enclosures are standardized with external reset. For internal reset, order mod code **R5**.

④ NEMA 12 enclosure is without safety door interlock. When safety door interlock is required, change seventh character from 8 to 9, i.e. ECN223**8**EAG becomes ECN223**9**EAG.

Note: Reference to *Enclosed Control Product Guide* — PG.3.02.T.E.

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Discount Symbol **1CD-1C**

Table 33-115. Class ECN23 — NEMA — Combination HMCP/E — Reversing

Motor Voltage	Max. hp Rating	Magnet Coil Voltage ①	Circuit Breaker Type	3-Pole, NEMA 1 General Purpose		3-Pole, NEMA 3R Rainproof		3-Pole, NEMA 4X Watertight & Dust-Tight Stainless Steel		3-Pole, NEMA 12 Dust-Tight Industrial External Reset (NEMA 3R) ②③④	
				Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
NEMA Size 0											
200	1	208	HMCPE 7A	**ECN2301EAC**	1,205.	**ECN2302EAC**	1,430.	**ECN2304EAC**	2,015.	**ECN2308EAC**	1,430.
	2		HMCPE 15A	**ECN2301EAD**	1,205.	**ECN2302EAD**	1,430.	**ECN2304EAD**	2,015.	**ECN2308EAD**	1,430.
230	1	240	HMCPE 7A	**ECN2301BAC**	1,205.	**ECN2302BAC**	1,430.	**ECN2304BAC**	2,015.	**ECN2308BAC**	1,430.
	3		HMCPE 15A	**ECN2301BAD**	1,205.	**ECN2302BAD**	1,430.	**ECN2304BAD**	2,015.	**ECN2308BAD**	1,430.
460	3/4	480	HMCPE 3A	**ECN2301CAB**	1,205.	**ECN2302CAB**	1,430.	**ECN2304CAB**	2,015.	**ECN2308CAB**	1,430.
	2		HMCPE 7A	**ECN2301CAC**	1,205.	**ECN2302CAC**	1,430.	**ECN2304CAC**	2,015.	**ECN2308CAC**	1,430.
	5		HMCPE 15A	**ECN2301CAD**	1,205.	**ECN2302CAD**	1,430.	**ECN2304CAD**	2,015.	**ECN2308CAD**	1,430.
575	1	600	HMCP 3A	**ECN2301DA5**	1,205.	**ECN2302DA5**	1,430.	**ECN2304DA5**	2,015.	**ECN2308DA5**	1,430.
	3		HMCP 7A	**ECN2301DA6**	1,205.	**ECN2302DA6**	1,430.	**ECN2304DA6**	2,015.	**ECN2308DA6**	1,430.
	5		HMCP 15A	**ECN2301DA7**	1,205.	**ECN2302DA7**	1,430.	**ECN2304DA7**	2,015.	**ECN2308DA7**	1,430.
NEMA Size 1											
200	1	208	HMCPE 7A	**ECN2311EAC**	1,285.	**ECN2312EAC**	1,510.	**ECN2314EAC**	2,095.	**ECN2318EAC**	1,510.
	2		HMCPE 15A	**ECN2311EAD**	1,285.	**ECN2312EAD**	1,510.	**ECN2314EAD**	2,095.	**ECN2318EAD**	1,510.
	7-1/2		HMCPE 30A	**ECN2311EAE**	1,285.	**ECN2312EAE**	1,510.	**ECN2314EAE**	2,095.	**ECN2318EAE**	1,510.
230	1	240	HMCPE 7A	**ECN2311BAC**	1,285.	**ECN2312BAC**	1,510.	**ECN2314BAC**	2,095.	**ECN2318BAC**	1,510.
	2		HMCPE 15A	**ECN2311BAD**	1,285.	**ECN2312BAD**	1,510.	**ECN2314BAD**	2,095.	**ECN2318BAD**	1,510.
	7-1/2		HMCPE 30A	**ECN2311BAE**	1,285.	**ECN2312BAE**	1,510.	**ECN2314BAE**	2,095.	**ECN2318BAE**	1,510.
460	3/4	480	HMCPE 3A	**ECN2311CAB**	1,285.	**ECN2312CAB**	1,510.	**ECN2314CAB**	2,095.	**ECN2318CAB**	1,510.
	2		HMCPE 7A	**ECN2311CAC**	1,285.	**ECN2312CAC**	1,510.	**ECN2314CAC**	2,095.	**ECN2318CAC**	1,510.
	5		HMCPE 15A	**ECN2311CAD**	1,285.	**ECN2312CAD**	1,510.	**ECN2314CAD**	2,095.	**ECN2318CAD**	1,510.
	10		HMCPE 30A	**ECN2311CAE**	1,285.	**ECN2312CAE**	1,510.	**ECN2314CAE**	2,095.	**ECN2318CAE**	1,510.
575	1	600	HMCP 3A	**ECN2311DA5**	1,285.	**ECN2312DA5**	1,510.	**ECN2314DA5**	2,095.	**ECN2318DA5**	1,510.
	3		HMCP 7A	**ECN2311DA6**	1,285.	**ECN2312DA6**	1,510.	**ECN2314DA6**	2,095.	**ECN2318DA6**	1,510.
	7-1/2		HMCP 15A	**ECN2311DA7**	1,285.	**ECN2312DA7**	1,510.	**ECN2314DA7**	2,095.	**ECN2318DA7**	1,510.
	10		HMCP 30A	**ECN2311DA8**	1,285.	**ECN2312DA8**	1,510.	**ECN2314DA8**	2,095.	**ECN2318DA8**	1,510.

Starters do not include heater packs. Select 1 carton of 3 heater packs. For Heater Pack Selection, see **Pages 33-36 – 33-37**.

① Other control power transformer primary and/or secondary voltages, see **Page 33-52**.

② Suitable for outdoor application when properly installed — see Page i-5 of P.G.3.02.T.E.

③ All NEMA 12 enclosures are standardized with external reset. For internal reset, order mod code **R5**.

④ NEMA 12 enclosure is without safety door interlock. When safety door interlock is required, change seventh character from 8 to 9, i.e. ECN233**8**EAG becomes ECN233**9**EAG.

Note: Reference to *Enclosed Control Product Guide* — PG.3.02.T.E.

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Discount Symbol **1CD-1C**

Table 33-115. Class ECN23 — NEMA — Combination HMCP/E — Reversing (Continued)

Motor Voltage	Max. hp Rating	Magnet Coil Voltage ①	Circuit Breaker Type	3-Pole, NEMA 1 General Purpose		3-Pole, NEMA 3R Rainproof		3-Pole, NEMA 4X Watertight & Dust-Tight Stainless Steel		3-Pole, NEMA 12 Dust-Tight Industrial External Reset (NEMA 3R) ②③④	
				Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
NEMA Size 2											
200	10	208	HMCPE 50A	**ECN2321EAF**	2,040.	**ECN2322EAF**	2,335.	**ECN2324EAF**	3,285.	**ECN2328EAF**	2,335.
230	15	240	HMCPE 50A	**ECN2321BAF**	2,040.	**ECN2322BAF**	2,335.	**ECN2324BAF**	3,285.	**ECN2328BAF**	2,335.
460	25	480	HMCPE 50A	**ECN2321CAF**	2,040.	**ECN2322CAF**	2,335.	**ECN2324CAF**	3,285.	**ECN2328CAF**	2,335.
575	25	600	HMCP 50A	**ECN2321DA9**	2,040.	**ECN2322DA9**	2,335.	**ECN2324DA9**	3,285.	**ECN2328DA9**	2,335.
NEMA Size 3											
200	25	208	HMCPE 100A	**ECN2331EAG**	3,050.	**ECN2332EAG**	3,440.	**ECN2334EAG**	5,230.	**ECN2338EAG**	3,440.
230	30	240	HMCPE 100A	**ECN2331BAG**	3,050.	**ECN2332BAG**	3,440.	**ECN2334BAG**	5,230.	**ECN2338BAG**	3,440.
460	50	480	HMCPE 100A	**ECN2331CAG**	3,050.	**ECN2332CAG**	3,440.	**ECN2334CAG**	5,230.	**ECN2338CAG**	3,440.
575	50	600	HMCP 100A	**ECN2331DAI**	3,050.	**ECN2332DAI**	3,440.	**ECN2334DAI**	5,230.	**ECN2338DAI**	3,440.
NEMA Size 4											
200	40	208	HMCP 150A	**ECN2341EAH**	6,910.	**ECN2342EAH**	7,960.	**ECN2344EAH**	9,660.	**ECN2348EAH**	7,960.
230	50	240	HMCP 150A	**ECN2341BAH**	6,910.	**ECN2342BAH**	7,960.	**ECN2344BAH**	9,660.	**ECN2348BAH**	7,960.
460	100	480	HMCP 150A	**ECN2341CAH**	6,910.	**ECN2342CAH**	7,960.	**ECN2344CAH**	9,660.	**ECN2348CAH**	7,960.
575	100	600	HMCP 150A	**ECN2341DAH**	6,910.	**ECN2342DAH**	7,960.	**ECN2344DAH**	9,660.	**ECN2348DAH**	7,960.
NEMA Size 5											
200	60	208	HMCP 250A	**ECN2351EAJ**	13,980.	**ECN2352EAJ**	16,500.	**ECN2354EAJ**	20,990.	**ECN2358EAJ**	16,500.
	75		HMCP 400A	**ECN2351EAK**	13,980.	**ECN2352EAK**	16,500.	**ECN2354EAK**	20,990.	**ECN2358EAK**	16,500.
230	75	240	HMCP 250A	**ECN2351BAJ**	13,980.	**ECN2352BAJ**	16,500.	**ECN2354BAJ**	20,990.	**ECN2358BAJ**	16,500.
	100		HMCP 400A	**ECN2351BAK**	13,980.	**ECN2352BAK**	16,500.	**ECN2354BAK**	20,990.	**ECN2358BAK**	16,500.
460	150	480	HMCP 250A	**ECN2351CAJ**	13,980.	**ECN2352CAJ**	16,500.	**ECN2354CAJ**	20,990.	**ECN2358CAJ**	16,500.
	200		HMCP 400A	**ECN2351CAK**	13,980.	**ECN2352CAK**	16,500.	**ECN2354CAK**	20,990.	**ECN2358CAK**	16,500.
575	200	600	HMCP 250A	**ECN2351DAJ**	13,980.	**ECN2352DAJ**	16,500.	**ECN2354DAJ**	20,990.	**ECN2358DAJ**	16,500.

Starters do not include heater packs. Select 1 carton of 3 heater packs. For Heater Pack Selection, see **Pages 33-36 – 33-37**.

① Starters with 120V coil (for separate control) are available. To order, substitute the letter **A** for the 8th character of the listed catalog number.

② Suitable for outdoor application when properly installed — see Page i-5 of P.G.3.02.T.E.

③ All NEMA 12 enclosures are standardized with external reset. For internal reset, order mod code **R5**.

④ NEMA 12 enclosure is without safety door interlock. When safety door interlock is required, change seventh character from 8 to 9, i.e. ECN2338EAG becomes ECN2339EAG.

Note: Reference to *Enclosed Control Product Guide* — PG.3.02.T.E.

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Discount Symbol **1CD-1C**

Table 33-116. Class ECN24 — NEMA — Combination HMCP/E with CPT — Non-reversing

Motor Voltage ①	Max. hp Rating	Secondary Magnet Coil Voltage	Circuit Breaker Type	3-Pole, NEMA 1 General Purpose		3-Pole, NEMA 3R Rainproof		3-Pole, NEMA 4X Watertight & Dust-Tight Stainless Steel		3-Pole, NEMA 12 Dust-Tight Industrial External Reset (NEMA 3R) ②③④	
				Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
NEMA Size 0											
208	1	120	HMCPE 7A	**ECN2401EAC**	1,032.	**ECN2402EAC**	1,192.	**ECN2404EAC**	1,682.	**ECN2408EAC**	1,192.
	2		HMCPE 15A	**ECN2401EAD**	1,032.	**ECN2402EAD**	1,192.	**ECN2404EAD**	1,682.	**ECN2408EAD**	1,192.
240	1	120	HMCPE 7A	**ECN2401BAC**	1,032.	**ECN2402BAC**	1,192.	**ECN2404BAC**	1,682.	**ECN2408BAC**	1,192.
	3		HMCPE 15A	**ECN2401BAD**	1,032.	**ECN2402BAD**	1,192.	**ECN2404BAD**	1,682.	**ECN2408BAD**	1,192.
480	3/4	120	HMCPE 3A	**ECN2401CAB**	1,032.	**ECN2402CAB**	1,192.	**ECN2404CAB**	1,682.	**ECN2408CAB**	1,192.
	2		HMCPE 7A	**ECN2401CAC**	1,032.	**ECN2402CAC**	1,192.	**ECN2404CAC**	1,682.	**ECN2408CAC**	1,192.
	5		HMCPE 15A	**ECN2401CAD**	1,032.	**ECN2402CAD**	1,192.	**ECN2404CAD**	1,682.	**ECN2408CAD**	1,192.
600	1	120	HMCP 3A	**ECN2401DA5**	1,032.	**ECN2402DA5**	1,192.	**ECN2404DA5**	1,682.	**ECN2408DA5**	1,192.
	3		HMCP 7A	**ECN2401DA6**	1,032.	**ECN2402DA6**	1,192.	**ECN2404DA6**	1,682.	**ECN2408DA6**	1,192.
	5		HMCP 15A	**ECN2401DA7**	1,032.	**ECN2402DA7**	1,192.	**ECN2404DA7**	1,682.	**ECN2408DA7**	1,192.
NEMA Size 1											
208	1	120	HMCPE 7A	**ECN2411EAC**	1,067.	**ECN2412EAC**	1,232.	**ECN2414EAC**	1,712.	**ECN2418EAC**	1,232.
	2		HMCPE 15A	**ECN2411EAD**	1,067.	**ECN2412EAD**	1,232.	**ECN2414EAD**	1,712.	**ECN2418EAD**	1,232.
	7-1/2		HMCPE 30A	**ECN2411EAE**	1,067.	**ECN2412EAE**	1,232.	**ECN2414EAE**	1,712.	**ECN2418EAE**	1,232.
240	1	120	HMCPE 7A	**ECN2411BAC**	1,067.	**ECN2412BAC**	1,232.	**ECN2414BAC**	1,712.	**ECN2418BAC**	1,232.
	2		HMCPE 15A	**ECN2411BAD**	1,067.	**ECN2412BAD**	1,232.	**ECN2414BAD**	1,712.	**ECN2418BAD**	1,232.
	7-1/2		HMCPE 30A	**ECN2411BAE**	1,067.	**ECN2412BAE**	1,232.	**ECN2414BAE**	1,712.	**ECN2418BAE**	1,232.
480	3/4	120	HMCPE 3A	**ECN2411CAB**	1,067.	**ECN2412CAB**	1,232.	**ECN2414CAB**	1,712.	**ECN2418CAB**	1,232.
	2		HMCPE 7A	**ECN2411CAC**	1,067.	**ECN2412CAC**	1,232.	**ECN2414CAC**	1,712.	**ECN2418CAC**	1,232.
	5		HMCPE 15A	**ECN2411CAD**	1,067.	**ECN2412CAD**	1,232.	**ECN2414CAD**	1,712.	**ECN2418CAD**	1,232.
	10		HMCPE 30A	**ECN2411CAE**	1,067.	**ECN2412CAE**	1,232.	**ECN2414CAE**	1,712.	**ECN2418CAE**	1,232.
600	1	120	HMCP 3A	**ECN2411DA5**	1,067.	**ECN2412DA5**	1,232.	**ECN2414DA5**	1,712.	**ECN2418DA5**	1,232.
	3		HMCP 7A	**ECN2411DA6**	1,067.	**ECN2412DA6**	1,232.	**ECN2414DA6**	1,712.	**ECN2418DA6**	1,232.
	7-1/2		HMCP 15A	**ECN2411DA7**	1,067.	**ECN2412DA7**	1,232.	**ECN2414DA7**	1,712.	**ECN2418DA7**	1,232.
	10		HMCP 30A	**ECN2411DA8**	1,067.	**ECN2412DA8**	1,232.	**ECN2414DA8**	1,712.	**ECN2418DA8**	1,232.

Starters do not include heater packs. Select 1 carton of 3 heater packs. For Heater Pack Selection, see **Pages 33-36 – 33-37**.

① Other control power transformer primary and/or secondary voltages, see **Page 33-52**.

② Suitable for outdoor application when properly installed — see Page i-5 of P.G.3.02.T.E.

③ All NEMA 12 enclosures are standardized with external reset. For internal reset, order mod code **R5**.

④ NEMA 12 enclosure is without safety door interlock. When safety door interlock is required, change seventh character from 8 to 9, i.e. ECN243**8**EAG becomes ECN243**9**EAG.

Note: Reference to *Enclosed Control Product Guide* — PG.3.02.T.E.

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Discount Symbol **1CD-1C**

Table 33-116. Class ECN24 — NEMA — Combination HMCP/E with CPT — Non-reversing (Continued)

Primary Voltage ①	Max. hp Rating	Secondary Magnet Coil Voltage	Circuit Breaker Type	3-Pole, NEMA 1 General Purpose		3-Pole, NEMA 3R Rainproof		3-Pole, NEMA 4X Watertight & Dust-Tight Stainless Steel		3-Pole, NEMA 12 Dust-Tight Industrial External Reset (NEMA 3R) ②③④	
				Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
NEMA Size 2											
208	10	120	HMCPE 50A	**ECN2421EAF**	1,515.	**ECN2422EAF**	1,740.	**ECN2424EAF**	2,500.	**ECN2428EAF**	1,740.
240	15		HMCPE 50A	**ECN2421BAF**	1,515.	**ECN2422BAF**	1,740.	**ECN2424BAF**	2,500.	**ECN2428BAF**	1,740.
480	25		HMCPE 50A	**ECN2421CAF**	1,515.	**ECN2422CAF**	1,740.	**ECN2424CAF**	2,500.	**ECN2428CAF**	1,740.
600	25	120	HMCP 50A	**ECN2421DA9**	1,515.	**ECN2422DA9**	1,740.	**ECN2424DA9**	2,500.	**ECN2428DA9**	1,740.
NEMA Size 3											
208	25	120	HMCPE 100A	**ECN2431EAG**	2,200.	**ECN2432EAG**	2,490.	**ECN2434EAG**	3,915.	**ECN2438EAG**	2,490.
240	30		HMCPE 100A	**ECN2431BAG**	2,200.	**ECN2432BAG**	2,490.	**ECN2434BAG**	3,915.	**ECN2438BAG**	2,490.
480	50		HMCPE 100A	**ECN2431CAG**	2,200.	**ECN2432CAG**	2,490.	**ECN2434CAG**	3,915.	**ECN2438CAG**	2,490.
600	50	120	HMCP 100A	**ECN2431DAI**	2,200.	**ECN2432DAI**	2,490.	**ECN2434DAI**	3,915.	**ECN2438DAI**	2,490.
NEMA Size 4											
208	40	120	HMCP 150A	**ECN2441EAH**	4,445.	**ECN2442EAH**	5,255.	**ECN2444EAH**	6,655.	**ECN2448EAH**	5,255.
240	50		HMCP 150A	**ECN2441BAH**	4,445.	**ECN2442BAH**	5,255.	**ECN2444BAH**	6,655.	**ECN2448BAH**	5,255.
480	100		HMCP 150A	**ECN2441CAH**	4,445.	**ECN2442CAH**	5,255.	**ECN2444CAH**	6,655.	**ECN2448CAH**	5,255.
600	100		HMCP 150A	**ECN2441DAH**	4,445.	**ECN2442DAH**	5,255.	**ECN2444DAH**	6,655.	**ECN2448DAH**	5,255.
NEMA Size 5											
208	60	120	HMCP 250A	**ECN2451EAJ**	9,775.	**ECN2452EAJ**	11,245.	**ECN2454EAJ**	15,385.	**ECN2458EAJ**	11,245.
	75		HMCP 400A	**ECN2451EAK**	9,775.	**ECN2452EAK**	11,245.	**ECN2454EAK**	15,385.	**ECN2458EAK**	11,245.
240	75	120	HMCP 250A	**ECN2451BAJ**	9,775.	**ECN2452BAJ**	11,245.	**ECN2454BAJ**	15,385.	**ECN2458BAJ**	11,245.
	100		HMCP 400A	**ECN2451BAK**	9,775.	**ECN2452BAK**	11,245.	**ECN2454BAK**	15,385.	**ECN2458BAK**	11,245.
480	150	120	HMCP 250A	**ECN2451CAJ**	9,775.	**ECN2452CAJ**	11,245.	**ECN2454CAJ**	15,385.	**ECN2458CAJ**	11,245.
	200		HMCP 400A	**ECN2451CAK**	9,775.	**ECN2452CAK**	11,245.	**ECN2454CAK**	15,385.	**ECN2458CAK**	11,245.
600	200	120	HMCP 250A	**ECN2451DAJ**	9,775.	**ECN2452DAJ**	11,245.	**ECN2454DAJ**	15,385.	**ECN2458DAJ**	11,245.

Starters do not include heater packs. Select 1 carton of 3 heater packs. For Heater Pack Selection, see **Pages 33-36 – 33-37**.

① Other control power transformer primary and/or secondary voltages, see **Page 33-52**.

② Suitable for outdoor application when properly installed — see Page i-5 of P.G.3.02.T.E.

③ All NEMA 12 enclosures are standardized with external reset. For internal reset, order mod code **R5**.

④ NEMA 12 enclosure is without safety door interlock. When safety door interlock is required, change seventh character from 8 to 9, i.e. ECN24**3**8EAG becomes ECN24**3**9EAG.

Note: Reference to *Enclosed Control Product Guide* — PG.3.02.T.E.

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Size 1 and 2 Starter

Product Description

Setting a New Standard in Motor Control

Revolutionary in design, Advantage motor starters employ state-of-the-art technology in solving motor control application problems that have existed for ages. Customer focus group input and 66,000 man-hours of engineering ingenuity have been combined to create a motor starter that dramatically extends operating life in a physical space requirement one half the size of conventional motor starters.

Offering motor overcurrent protection accurate to 2% at maximum FLC, Advantage also maintains constant coil power regardless of varying control circuit conditions, eliminating coil burnout, contact chatter and welding due to low voltage of fluttering control signals.

Advantage is designed with a full complement of features that make it the most versatile motor starter in the industry. Multifunction overload protection options provide application flexibility while reducing inventory. Communication capability extends benefits, allowing Advantage to be interactively linked to higher order control systems for monitoring, troubleshooting and control.

Technological advances incorporated in the Advantage design, such as prestart diagnostics, increased accuracy and the ability to communicate with other systems, are benefits not realized in traditional motor starters.

Benefits

Advantage Breakthroughs

To achieve the level of benefits envisioned for Advantage controls at a competitive price, it was discovered early in the development process that simply improving existing design concepts would fall short of the mark. A new approach involving a higher level of technology was required. The result was the incorporation of three technical breakthroughs — new current sensing monitoring, an energy-balanced contact closure system that increased life by decreasing electrical and mechanical wear and an intelligent coil controller optimizing the contact closing process based on varying control circuit conditions. Coordinating these breakthroughs to provide enhanced motor control performance is concentrated in the SURE chip.

Patented SURE Chip Increases Life

Advantage uses the right combination of brains and brawn in effecting a motor start. The power circuit of the contactor employs heavy-duty silver alloy contacts scientifically designed for long life. The addition of a uniquely developed application-specific microprocessor chip, called SURE, regulates power supplied to the operating coil. The regulated closing profile is tailored to existing control circuit conditions by the SURE chip. This results in an energy balanced system which reduces armature/magnet crash and contact bounce, extending mechanical and electrical life.

Improved Protection and Motor Utilization

The motor circuit monitoring and overload protection functions of Advantage starters are provided by three current sensors closely monitored by the SURE chip. This sensor/microprocessor combination yields a protection scheme closely paralleling that of the motor heating damage boundary expressed in terms of current and time. Accurate to 2% of full scale, Advantage allows full utilization of motor capability without motor damage or nuisance tripping.

No Heaters, Small Size

Advantage starters eliminate the need for costly heater elements and their associated installation expense. Standard overload protection functions include phase loss and unbalance protection, selectable trip class, automatic/manual reset and ground current protection.

Built-In Communications Capabilities Provide Two-Way Control

Advantage also offers low cost communication capability. ON/OFF commands, status and motor data can be linked to automated control systems without the addition of costly sensors, I/O modules and transducers, in a language compatible with many computer-based software systems in use today.

Protected by 22 patents and proven in many years of operating experience in harsh industrial applications, Advantage motor starters and contactors offer the user unprecedented value at a price competitive with traditional devices.

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Size 3 and 4 Starter

Product Description

Catalog Number W201 — Non-reversing Contactors

Catalog Number W211 — Horizontal Reversing Contactors (shown above) — long axis horizontal

Catalog Number W251 — Vertical Reversing Contactors (not illustrated) — long axis vertical

Features

- Small physical size
- Brownout protection
- Communications capability
- Long electrical life
- Higher contact force

Product Selection

When Ordering Specify

- Non-reversing Catalog Number as specified in table below.
- Reversing Catalog Number as specified in table below.

Table 33-117. Advantage Contactors — 3-Pole Non-reversing and Reversing — NEMA Sizes 1 – 6

NEMA Size	Motor Voltage	Max. hp	Continuous Amperes (Enclosed)	Coil Voltage/Hz	Non-reversing Catalog Number	Price U.S. $	Reversing Catalog Number (Horizontal)	Price U.S. $	Reversing Catalog Number (Vertical)	Price U.S. $
1	200 230 460 575	7-1/2 7-1/2 10 10	27	120/60 110/50	**W201K1CF** **W201K1CN**	242. 242.	**W211K1CF** **W211K1CN**	580. 580.	**W251K1CF** **W251K1CN**	580. 580.
2	200 230 460 575	10 15 25 25	45	120/60 110/50	**W201K2CF** **W201K2CN**	440. 440.	**W211K2CF** **W211K2CN**	1,115. 1,115.	**W251K2CF** **W251K2CN**	1,115. 1,115.
3	200 230 460 575	25 30 50 50	90	120/60 110/50	**W201K3CF** **W201K3CN**	715. 715.	**W211K3CF** **W211K3CN**	1,845. 1,845.	**W251K3CF** **W251K3CN**	1,845. 1,845.
4	200 230 460 575	40 50 100 100	135	120/60 110/50	**W201K4CF** **W201K4CN**	1,715. 1,715.	**W211K4CF** **W211K4CN**	4,590. 4,590.	**W251K4CF** **W251K4CN**	4,590. 4,590.
5	200 230 460 575	75 100 200 200	270	120/60 110/50	**W201K5CF** **W201K5CN**	3,715. 3,715.	**W211K5CF** **W211K5CN**	8,350. 8,350.	**W251K5CF** **W251K5CN**	8,350. 8,350.
6	200 230 460 575	150 200 400 400	540	120/60 110/50	**W201K6CF** **W201K6CN**	10,140. 10,140.	**W211K6CF** **W211K6CN**	20,840. 20,840.	**W251K6CF** **W251K6CN**	20,840. 20,840.

Discount Symbol **1CD1**

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Size 5 and 6 Starter

Product Description

Catalog Number W200 — Non-reversing Starters (shown above)

Catalog Number W210 — Horizontal Reversing Starters — long axis horizontal.

Catalog Number W250 — Vertical Reversing Starters (not illustrated) — long axis vertical.

Features

Starter

- Small physical size
- Brownout protection
- Communications capability
- Minimized bounce times
- Higher contact force
- Common auxiliary contacts

Motor Protection

- Heaters not required — selectable settings
- Overload protection — accuracy 2%
- Phase loss and phase unbalance protection
- Ground current protection

OL Protection Settings

- Selectable automatic/manual reset
- Selectable trip class — 10, 20, 30 or no protection (disables overload)
- Selectable trip current

Technical Data

Table 33-118. Motor FLA Ranges

NEMA Size	1.15 to 1.25 Service Factor	1.0 Service Factor
1 ①	.47 – 3.81	.51 – 4.14
1	3.15 – 27.0	3.43 – 27.0
2	3.15 – 45.0	3.43 – 45.0
3	9.90 – 90.0	10.8 – 90.0
4	9.90 – 135	10.8 – 135
5	38.3 – 270	41.7 – 270
6	38.3 – 540	41.7 – 540

① For motor full load current (FLA) range of .47A – 3.81A with a 1.15 to 1.25 service factor and for motor hp range of 1/4 hp to 2 hp at 460V.

Options

Table 33-119. Optional Features

Description	Catalog Number Suffix
Omit Class II Ground-Current Protection	**Y7**
Omit Phase-Loss Protection	**Y4**
Omit both Class II Ground-Current Protection and Phase-Loss Protection	**Y4Y7**

Product Selection

When Ordering Specify

- Non-reversing Catalog Number as specified in table below.
- Reversing Catalog Number as specified in table below.

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Table 33-120. Advantage Starters — 3-Pole Non-reversing and Reversing — Wired for Separate Control — Heaters Not Required — NEMA Sizes 1 – 6

NEMA Size	Motor Voltage	Max. hp	Continuous Amperes (Enclosed)	Coil Voltage/Hz	Non-reversing Catalog Number	Price U.S. $	Reversing Catalog Number (Horizontal)	Price U.S. $	Reversing Catalog Number (Vertical)	Price U.S. $
1 ①	200 230 460 575	1 1 2 2	27	120/60 110/50	**W200MLCFC** **W200MLCNC**	311. 311.	**W210MLCFC** **W210MLCNC**	655. 655.	**W250MLCFC** **W250MLCNC**	655. 655.
1	200 230 460 575	7-1/2 7-1/2 10 10	27	120/60 110/50	**W200M1CFC** **W200M1CNC**	311. 311.	**W210M1CFC** **W210M1CNC**	655. 655.	**W250M1CFC** **W250M1CNC**	655. 655.
2	200 230 460 575	10 15 25 25	45	120/60 110/50	**W200M2CFC** **W200M2CNC**	540. 540.	**W210M2CFC** **W210M2CNC**	1,100. 1,100.	**W250M2CFC** **W250M2CNC**	1,100. 1,100.
3	200 230 460 575	25 30 50 50	90	120/60 110/50	**W200M3CFC** **W200M3CNC**	855. 855.	**W210M3CFC** **W210M3CNC**	1,980. 1,980.	**W250M3CFC** **W250M3CNC**	1,980. 1,980.
4	200 230 460 575	40 50 100 100	135	120/60 110/50	**W200M4CFC** **W200M4CNC**	1,905. 1,905.	**W210M4CFC** **W210M4CNC**	4,780. 4,780.	**W250M4CFC** **W250M4CNC**	4,780. 4,780.
5	200 230 460 575	75 100 200 200	270	120/60 110/50	**W200M5CFC** **W200M5CNC**	4,595. 4,595.	**W210M5CFC** **W210M5CNC**	9,240. 9,240.	**W250M5CFC** **W250M5CNC**	9,240. 9,240.
6	200 230 460 575	150 200 400 400	540	120/60 110/50	**W200M6CFC** **W200M6CNC**	10,870. 10,870.	**W210M6CFC** **W210M6CNC**	21,550. 21,550.	**W250M6CFC** **W250M6CNC**	21,550. 21,550.

① For motor full load current (FLA) range of .47A – 3.81A with a 1.15 to 1.25 service factor and for motor hp range of 1/4 hp to 2 hp at 460V.

Discount Symbol **1CD1**

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Product Selection

When Ordering Specify

- Catalog Number as shown in table below.

Table 33-121. Two-Speed Advantage Starters — Wired for Separate Control — Heaters Not Required — NEMA Sizes 1 – 6

NEMA Size	Motor Voltage	Max. Horsepower		Continuous Amperes (Enclosed)	Coil Voltage/ Hz	Open Type (Horizontal)	
		Constant or Variable Torque	Constant hp			Catalog Number	Price U.S. $
For Separate (2) Winding Type Motors — Wye Wye							
1 ①	200 230 460 575	1 1 2 2	1 1 2 2	27	120/60 110/50	**W960MLCFCM3** **W960MLCNCM3**	922. 922.
1	200 230 460 575	7-1/2 7-1/2 10 10	5 5 7-1/2 7-1/2	27	120/60 110/50	**W960M1CFCM3** **W960M1CNCM3**	922. 922.
2	200 230 460 575	10 15 25 25	7-1/2 10 20 20	45	120/60 110/50	**W960M2CFCM3** **W960M2CNCM3**	1,561. 1,561.
3	200 230 460 575	25 30 50 50	20 25 40 40	90	120/60 110/50	**W960M3CFCM3** **W960M3CNCM3**	2,388. 2,388.
4	200 230 460 575	40 50 100 100	30 40 75 75	135	120/60 110/50	**W960M4CFCM3** **W960M4CNCM3**	5,888. 5,888.
5	200 230 460 575	75 100 200 200	60 75 150 150	270	120/60 110/50	**W960M5CFCM3** **W960M5CNCM3**	13,823. 13,823.
6	200 230 460 575	150 200 400 400	100 150 300 300	540	120/60 110/50	**W960M6CFCM3** **W960M6CNCM3**	25,911. 25,911.

① For motor full load current (FLA) range of .47A – 3.81A with a 1.15 to 1.25 service factor and for motor hp range of 1/4 hp to 2 hp at 460V.

Discount Symbol **1CD1**

Table 33-121. Two-Speed Advantage Starters — Wired for Separate Control — Heaters Not Required — NEMA Sizes 1– 6 (Continued)

NEMA Size	Motor Voltage	Max. Horsepower		Continuous Amperes (Enclosed)	Coil Voltage/ Hz	Open Type (Horizontal)	
		Constant or Variable Torque	Constant hp			Catalog Number	Price U.S. $
For Single Winding Type Motors Constant Horsepower							
1 ①	200 230 460 575	—	1 1 2 2	27	120/60 110/50	**W970MLCFCM3** **W970MLCNCM3**	1,226.50 1,226.50
1	200 230 460 575	—	5 5 7-1/2 7-1/2	27	120/60 110/50	**W970M1CFCM3** **W970M1CNCM3**	1,226.50 1,226.50
2	200 230 460 575	—	7-1/2 10 20 20	45	120/60 110/50	**W970M2CFCM3** **W970M2CNCM3**	2,127.50 2,127.50
3	200 230 460 575	—	20 25 40 40	90	120/60 110/50	**W970M3CFCM3** **W970M3CNCM3**	3,173.00 3,173.00
4	200 230 460 575	—	30 40 75 75	135	120/60 110/50	**W970M4CFCM3** **W970M4CNCM3**	8,109.00 8,109.00
5	200 230 460 575	—	60 75 150 150	270	120/60 110/50	**W970M5CFCM3** **W970M5CNCM3**	15,965.00 15,965.00
6	200 230 460 575	—	100 150 300 300	540	120/60 110/50	**W970M6CFCM3** **W970M6CNCM3**	35,683.00 35,683.00
For Single Winding Type Motors (Constant or Variable Torque)							
1 ①	200 230 460 575	1 1 2 2	—	27	120/60 110/50	**W980MLCFCM3** **W980MLCNCM3**	1,226.50 1,226.50
1	200 230 460 575	7-1/2 7-1/2 10 10	—	27	120/60 110/50	**W980M1CFCM3** **W980M1CNCM3**	1,226.50 1,226.50
2	200 230 460 575	10 15 25 25	—	45	120/60 110/50	**W980M2CFCM3** **W980M2CNCM3**	2,127.50 2,127.50
3	200 230 460 575	25 30 50 50	—	90	120/60 110/50	**W980M3CFCM3** **W980M3CNCM3**	3,173.00 3,173.00
4	200 230 460 575	40 50 100 100	—	135	120/60 110/50	**W980M4CFCM3** **W980M4CNCM3**	8,109.00 8,109.00
5	200 230 460 575	75 100 200 200	—	270	120/60 110/50	**W980M5CFCM3** **W980M5CNCM3**	15,965.00 15,965.00
6	200 230 460 575	150 150 400 400	—	540	120/60 110/50	**W980M6CFCM3** **W980M6CNCM3**	35,683.00 35,683.00

① For motor full load current (FLA) range of .47A – 3.81A with a 1.15 to 1.25 service factor and for motor hp range of 1/4 hp to 2 hp at 460V.

Discount Symbol **1CD1**

Table 33-122. Electrical Characteristics, Sizes 1 – 6

Description	Size 1	Size 2	Size 3	Size 4	Size 5	Size 6
Maximum Voltage Rating	600V	600V	600V	600V	600V	600V
Ampere Rating — Open	30A	50A	100A	150A	300A	600A
— Enclosed	27A	45A	90A	135A	270A	540A
Maximum Horsepower — Squirrel Cage Motor						
200V, 60 Hz	7-1/2 hp	10 hp	25 hp	40 hp	75 hp	150 hp
230V, 60 Hz	7-1/2 hp	15 hp	30 hp	50 hp	100 hp	200 hp
380V, 50 Hz	10 hp	25 hp	50 hp	75 hp	150 hp	300 hp
460 – 575V, 60 Hz	10 hp	25 hp	50 hp	100 hp	200 hp	400 hp
Resistive Heating, kW ① — Three-Phase, 3-Pole						
120V	5 kW	8.5 kW	17 kW	26 kW	52 kW	105 kW
240V	10 kW	17 kW	34 kW	68 kW	105 kW	210 kW
480V	20 kW	34 kW	68 kW	105 kW	210 kW	415 kW
600V	25 kW	43 kW	86 kW	130 kW	260 kW	515 kW
Capacitor Switching kVAR — Three-Phase						
240V	—	12 kVAR	27 kVAR	40 kVAR	80 kVAR	160 kVAR
480V	—	25 kVAR	53 kVAR	80 kVAR	160 kVAR	320 kVAR
600V	—	32 kVAR	67 kVAR	100 kVAR	200 kVAR	400 kVAR
Transformer Switching, kVA ② — Three-Phase, 3-Pole						
208V	3.6 kVA	6.3 kVA	12 kVA	20 kVA	41 kVA	81 kVA
240V	4.3 kVA	7.2 kVA	14 kVA	23 kVA	47 kVA	94 kVA
480V	8.5 kVA	14 kVA	28 kVA	47 kVA	94 kVA	188 kVA
600V	11 kVA	18 kVA	35 kVA	59 kVA	117 kVA	234 kVA

① Resistive loads having inrush currents not exceeding 1.5 times continuous rating.
② Transformers having inrush currents not more than 20 times peak of continuous current ratings.

Table 33-123. 380V, 50 Hz Starters — Maximum Horsepower Ratings

NEMA Size	1	2	3	4	5	6
Maximum hp	10	25	50	75	150	300

Ground Current Sensing Protection

Cutler-Hammer Advantage starters with ground current sensing protection feature provide equipment protection against ground currents between a factory-set low level and a lockout current. It is designed to open the circuit when it senses the low-level and arcing ground currents often occurring in motor branch circuits. This feature is standard with Cutler-Hammer Advantage starters. The ground current sensing protection feature can either be omitted from devices supplied by the factory, or omitted in the field by modifying the device with an Advantage Programming Module (WAPM).

Note: These devices are NOT Ground Fault Interrupters (GFIs) designed to protect people. Additionally, branch circuit short-circuit protective devices are to be used to clear faults that exceed the interrupting rating of the starter.

Table 33-124. Ground Current Sensing

Size	Trip Current	Lockout Current	Trip Time
IL	10	24	.4 sec.
1	10	48	.4 sec.
2	20	86	.4 sec.
3	40	171	.4 sec.
4	60	256	.4 sec.
5	240	1045	.4 sec.
6	240	1045	.4 sec.

The table above gives trip amperes and lockout amperes for each size of the starter. Lockout current is the sum of the phase current and ground current.

Phase Unbalance

If the unbalance of any two phases is greater than 30% of the DIP switch selected trip rating of the starter, a phase unbalance is declared and a trip occurs. No time delay is required for reset. This feature is standard in the Cutler-Hammer Advantage starter. To customize your protection, phase unbalance can be omitted by disabling the protection using an Advantage Programming Module (WAPM).

Phase Loss

The Advantage starter will trip on phase loss, after two seconds, if the current in any one phase is lower than the currents listed in the table below. No time delay is required for reset. Phase loss protection is standard on the Cutler-Hammer Advantage starter. The phase loss protection feature can either be omitted from devices supplied by the factory, or omitted in the field by modifying the device with an Advantage Programming Module (WAPM).

Table 33-125. Phase Trip Time

	Size 1	Size 2	Size 3	Size 4	Size 5	Size 6
Phase Unbalance Level	30% Unbalance					
Phase Unbalance Trip Delay	6 sec.		9 sec.		12 sec.	
Phase Loss Trip after 2 sec. if Phase Current is below:	.15A ③ 1.15A	1.15A	2.5A	2.5A	11A	11A

③ Size 1 Lower Current Range for motor hp range of 1/4 hp to 2 hp at 460V.

Table 33-126. Operating Coil Characteristics at Rated Coil Volts, Sizes 1 – 6

Description	Size 1	Size 2	Size 3	Size 4	Size 5	Size 6
AC Coil						
Burden — Inrush VA	250 VA	250 VA	500 VA	500 VA	2600 VA	2600 VA
Closed VA	25 VA	25 VA	50 VA	50 VA	50 VA	50 VA
Closed Watts	5W	5W	10W	10W	10W	10W
Pick-Up Volts ①	78V	78V	78V	78V	78V	78V
Drop-Out Volts ①	60V	60V	60V	60V	60V	60V
Recommended VA rating for machine tool control power transformers	100 VA	100 VA	150 VA	150 VA	300 VA	300 VA

Note: The above represent typical production test values and should not be interpreted as a guarantee of actual performance.
① Values may vary based upon control power transformer capacities.

Advantage contactors will withstand 110% of their rated voltage continuously without injury to the operating coils and will close successfully at 65% of their rated voltage.

Table 33-127. Mechanical Characteristics — Sizes 1 – 6

Description	Size 1	Size 2	Size 3	Size 4	Size 5	Size 6
Dimensions in Inches (mm)						
Height	6.50 (165.1)	6.50 (165.1)	8.00 (203.2)	8.00 (203.2)	10.08 (256.0)	10.08 (256.0)
Width	2.50 (63.5)	2.50 (63.5)	3.68 (93.5)	3.68 (93.5)	7.07 (179.6)	7.07 (179.6)
Depth	4.96 (126.0)	4.96 (126.0)	6.54 (166.1)	6.54 (166.1)	7.64 (194.1)	7.64 (194.1)
Panel area, square inches	16.25	16.25	29.44	29.44	71.27	71.27
Shipping weight, lbs.	2.00	2.00	6.00	6.00	30.00	30.00
Maximum cable size/phase copper — AWG/MCM ②	8 AWG	4 AWG	250 MCM ②	250 MCM ②	(1) 500 MCM ②	(2) 500 MCM ②
Auxiliary Electrical Circuits Available	8	8	8	8	8	8
Maximum wire size for auxiliary electrical circuit — AWG	12	12	12	12	12	12
Maximum wire size for control circuit — AWG	(2) 14	(2) 14	(2) 14	(2) 14	(2) 14	(2) 14
Mechanical interlock combinations available	Vert. Horiz.	Vert. Horiz.	Vert. Horiz.	Vert. Horiz.	Vert. Horiz.	Vert. Horiz.

② Also referenced as "kcmil" (1990 NEC).

Motor FLA, Three-Phase AC

Table 33-128. Data from Table 430-150 of 1990 NEC

Horsepower	Squirrel Cage AC			
	200V	230V	460V	575V
1/4	1.15	1	.6	.5
1/2	2.3	2.0	1.0	.8
3/4	3.2	2.8	1.4	1.1
1	4.1	3.6	1.8	1.4
1-1/2	6.0	5.2	2.6	2.1
2	7.8	6.8	3.4	2.7
3	11.0	9.6	4.8	3.9
5	17.5	15.2	7.6	6.1
7-1/2	25.3	22	11	9
10	32.2	28	14	11
15	48.3	42	21	17
20	62.1	54	27	22
25	78.2	68	34	27
30	92	80	40	32
40	120	104	52	41
50	150	130	65	52
60	177	154	77	62
75	221	192	96	77
100	286	248	124	99
125	359	312	156	125
150	414	360	180	144
200	552	480	240	192

Note: These current values are for motors running at usual speeds and with normal torque characteristics. Motors for special low speed or high torque may require higher current. In all cases, OL trip current setting should be selected on basis of information on motor nameplate or motor card data.

Table 33-129. Temperature Specifications, Sizes 1 – 6

Ambient Temperature	
Storage	-40° to 100°C (-40° to 212°F)
Operating	-40° to 70°C (-40° to 168°F)
External (NEMA Enclosed)	-40° to 40°C (-40° to 104°F)

Table 33-130. DIP Switch Overload Protection Settings

Reset Method	Position 8
MANUAL (Non-automatic — wait 5 minutes)	0
AUTOMATIC (Reset time is based on protection Class)	1

Overload Class	Position 7	Position 6
10	0	0
20	0	1
30	1	0
None	1	1

Overload Trip Current Settings

Full Voltage Starters

To select the overload current trip setting, find the starter size table. Locate the full load current from motor nameplate in column A or B. Change DIP switch positions 5 – 1 to correspond to the table.

Reduced Voltage Starters

Multiply the full load current from motor nameplate by factor below for your type of reduced voltage starter. Find this adjusted full load current in starter Size table in Column A or B. Change DIP switch positions 5 – 1 to correspond to the table.

Table 33-131. Factor

Catalog Number	Multiplier Factor
W600 Autotransformer	1.0
W700 Part Winding	.5
W800, W890 Wye-Delta	.575

Table 33-132. Size 1 — Lower Current Range

Column A Service Factor 1.15 to 1.25		Column B Service Factor 1.0		Trip Rating Amperes	DIP Switch Setting ① (Positions) (54321)
Min.	Max.	Min.	Max.		
.47 –	.51	.51 –	.56	.59	00000
.52 –	.56	.57 –	.61	.65	00001
.57 –	.61	.62 –	.67	.71	00010
.62 –	.68	.68 –	.74	.78	00011
.69 –	.75	.75 –	.82	.86	00100
.76 –	.82	.83 –	.89	.95	00101
.83 –	.90	.90 –	.98	1.04	00110
.91 –	1.00	.99 –	1.09	1.14	00111
1.01 –	1.09	1.10 –	1.19	1.26	01000
1.10 –	1.21	1.20 –	1.31	1.38	01001
1.22 –	1.33	1.32 –	1.44	1.52	01010
1.34 –	1.46	1.45 –	1.59	1.67	01011
1.47 –	1.61	1.60 –	1.75	1.84	01100
1.62 –	1.77	1.76 –	1.93	2.02	01101
1.78 –	1.95	1.94 –	2.12	2.23	01110
1.96 –	2.14	2.13 –	2.33	2.45	01111
2.15 –	2.36	2.34 –	2.56	2.69	10000
2.37 –	2.60	2.57 –	2.82	2.96	10001
2.61 –	2.85	2.83 –	3.10	3.26	10010
2.86 –	3.14	3.11 –	3.42	3.58	10011
3.15 –	3.46	3.43 –	3.76	3.94	10100
3.47 –	3.81	3.77 –	4.14	4.34	10101

① All settings not shown are equivalent to 00000.

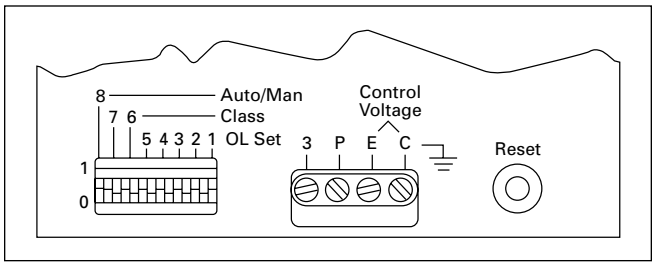


Figure 33-29. DIP Switch, Terminals and Reset

Table 33-133. Size 1 — Upper Current Range

Column A Service Factor 1.15 to 1.25		Column B Service Factor 1.0		Trip Rating Amperes	DIP Switch Setting ② (Positions) (54321)
Min.	Max.	Min.	Max.		
3.15 –	3.46	3.43 –	3.75	3.93	00000
3.47 –	3.81	3.76 –	4.13	4.33	00001
3.82 –	4.19	4.14 –	4.55	4.77	00010
4.20 –	4.61	4.56 –	4.99	5.25	00011
4.62 –	5.0	5.00 –	5.4	5.77	00100
5.2 –	5.5	5.5 –	6.0	6.35	00101
5.6 –	6.0	6.1 –	6.5	6.9	00110
6.1 –	6.6	6.6 –	7.2	7.7	00111
6.7 –	7.3	7.3 –	8.0	8.5	01000
7.4 –	8.1	8.1 –	8.8	9.3	01001
8.2 –	8.9	8.9 –	9.6	10.2	01010
9.0 –	9.8	9.7 –	10.6	11.2	01011
9.9 –	0.8	10.7 –	11.7	12.4	01100
10.9 –	11.9	11.8 –	12.9	13.6	01101
12.0 –	13.1	13.0 –	14.2	15.0	01110
13.2 –	14.4	14.3 –	15.7	16.5	01111
14.5 –	15.8	15.8 –	17.2	18.1	10000
15.9 –	17.4	17.3 –	18.9	19.9	10001
17.5 –	19.2	19.0 –	20.9	21.9	10010
19.3 –	21.1	21.0 –	22.9	24.1	10011
21.2 –	23.3	23.0 –	25.2	26.5	10100
23.4 –	25.6	25.3 –	27.0	29.1	10101
25.7 –	27.0	—	—	32.1	10110

② All settings not shown are equivalent to 00000.

Table 33-134. Size 2 — Current Range

Column A Service Factor 1.15 to 1.25		Column B Service Factor 1.0		Trip Rating Amperes	DIP Switch Setting ③ (Positions) (54321)
Min.	Max.	Min.	Max.		
3.15 –	3.46	3.43 –	3.75	3.93	00000
3.47 –	3.81	3.76 –	4.13	4.33	00001
3.82 –	4.19	4.14 –	4.55	4.77	00010
4.20 –	4.61	4.56 –	4.99	5.25	00011
4.62 –	5.0	5.00 –	5.4	5.77	00100
5.1 –	5.5	5.5 –	6.0	6.35	00101
5.6 –	6.0	6.1 –	6.5	6.9	00110
6.1 –	6.6	6.6 –	7.2	7.7	00111
6.7 –	7.3	7.3 –	8.0	8.5	01000
7.4 –	8.1	8.1 –	8.8	9.3	01001
8.2 –	8.9	8.9 –	9.6	10.2	01010
9.0 –	9.8	9.7 –	10.6	11.2	01011
9.9 –	10.8	10.7 –	11.7	12.4	01100
10.9 –	11.9	11.8 –	12.9	13.6	01101
12.0 –	13.1	13.0 –	14.2	15.0	01110
13.2 –	14.4	14.3 –	15.7	16.5	01111
14.5 –	15.8	15.8 –	17.2	18.1	10000
15.9 –	17.4	17.3 –	18.9	19.9	10001
17.5 –	19.2	19.0 –	20.9	21.9	10010
19.3 –	21.1	21.0 –	22.9	24.1	10011
21.2 –	23.2	23.0 –	25.2	26.5	10100
23.3 –	25.6	25.3 –	27.8	29.1	10101
25.7 –	28.1	27.9 –	30.5	32.1	10110
28.2 –	31.0	30.6 –	33.7	35.3	10111
31.1 –	34.1	33.8 –	37.0	38.9	11000
34.2 –	37.5	37.1 –	40.7	42.8	11001
37.6 –	41.2	40.8 –	44.8	47.0	11010
41.3 –	45.0	44.9 –	45.0	51.6	11011

③ All settings not shown are equivalent to 00000.

Overload Trip Current Settings (Continued)

Table 33-135. Size 3 Current Range

Column A Service Factor 1.15 to 1.25		Column B Service Factor 1.0		Trip Rating Amperes	DIP Switch Setting ① (Positions) (54321)
Min.	Max.	Min.	Max.		
9.9 –	10.8	10.8 –	11.7	12.4	00000
10.9 –	11.9	11.8 –	12.9	13.6	00001
12.0 –	13.1	13.0 –	14.2	15.0	00010
13.2 –	14.4	14.3 –	15.6	16.5	00011
14.5 –	15.8	15.7 –	17.2	18.1	00100
15.9 –	17.3	17.3 –	18.9	19.9	00101
17.5 –	19.2	19.0 –	20.9	21.9	00110
19.3 –	21.1	21.0 –	22.9	24.1	00111
21.2 –	23.2	23.0 –	25.2	26.5	01000
23.3 –	25.6	25.3 –	27.8	29.1	01001
25.7 –	28.1	27.9 –	30.6	32.1	01010
28.2 –	30.9	30.7 –	33.6	35.3	01011
31.0 –	34.1	33.7 –	37.0	38.8	01100
34.2 –	37.5	37.1 –	40.8	42.7	01101
37.6 –	41.3	40.9 –	44.9	47.0	01110
41.4 –	45.4	45.0 –	49.4	51.7	01111
45.5 –	50.0	49.5 –	54.3	56.9	10000
50.1 –	54.9	54.4 –	59.7	62.6	10001
55.0 –	60.5	59.8 –	65.7	68.8	10010
60.6 –	66.5	65.8 –	72.3	75.7	10011
66.6 –	73.2	72.4 –	79.6	83.3	10100
73.3 –	80.7	79.7 –	87.7	91.6	10101
80.8 –	88.7	87.8 –	90.0	101.0	10110
88.8 –	90.0	—	—	111.0	10111

① All settings not shown are equivalent to 00000.

Table 33-136. Size 4 Current Range

Column A Service Factor 1.15 to 1.25		Column B Service Factor 1.0		Trip Rating Amperes	DIP Switch Setting ② (Positions) (54321)
Min.	Max.	Min.	Max.		
9.9 –	10.8	10.8 –	11.7	12.4	00000
10.9 –	11.9	11.8 –	12.9	13.6	00001
12.0 –	13.1	13.0 –	14.2	15.0	00010
13.2 –	14.4	14.3 –	15.6	16.5	00011
14.5 –	15.8	15.7 –	17.2	18.1	00100
15.9 –	17.4	17.3 –	18.9	19.9	00101
17.5 –	19.2	19.0 –	20.9	21.9	00110
19.3 –	21.1	21.0 –	22.9	24.1	00111
21.2 –	23.2	23.0 –	25.2	26.5	01000
23.3 –	25.6	25.3 –	27.8	29.1	01001
25.7 –	28.1	27.9 –	30.6	32.1	01010
28.2 –	30.9	30.7 –	33.6	35.3	01011
31.0 –	34.1	33.7 –	37.0	38.8	01100
34.2 –	37.5	37.1 –	40.8	42.7	01101
37.6 –	41.3	40.9 –	44.9	47.0	01110
41.4 –	45.4	45.0 –	49.4	51.7	01111
45.5 –	50.0	49.5 –	54.3	56.9	10000
50.1 –	54.9	54.4 –	59.7	62.6	10001
55.0 –	60.5	59.8 –	65.7	68.8	10010
60.6 –	66.5	65.8 –	72.3	75.7	10011
66.6 –	73.2	72.4 –	79.6	83.3	10100
73.3 –	80.7	79.7 –	87.7	91.6	10101
80.8 –	88.7	87.8 –	96.4	101	10110
88.8 –	97.5	96.5 –	105	111	10111
97.6 –	106	106 –	116	122	11000
107 –	117	117 –	127	134	11001
118 –	129	128 –	133	147	11010
130 –	133	—	—	162	11011

② All settings not shown are equivalent to 00000.

Table 33-137. Size 5 Current Range

Column A Service Factor 1.15 to 1.25		Column B Service Factor 1.0		Trip Rating Amperes	DIP Switch Setting ③ (Positions) (54321)
Min.	Max.	Min.	Max.		
38.3 –	41.9	41.7 –	45.6	47.9	00000
42.0 –	46.1	45.7 –	50.1	52.5	00001
46.2 –	51.0	50.2 –	55.5	57.7	00010
51.1 –	55.9	55.6 –	60.8	63.9	00011
56.0 –	61.7	60.9 –	67.1	70.0	00100
61.8 –	67.5	67.2 –	73.4	77.3	00101
67.6 –	74.9	73.5 –	81.4	84.5	00110
75.0 –	82.3	81.5 –	89.5	93.7	00111
82.4 –	90.3	89.6 –	98.2	103	01000
90.4 –	99.9	98.3 –	108	113	01001
100 –	100	109 –	118	125	01010
110 –	110	119 –	130	137	01011
121 –	121	131 –	143	151	01100
133 –	133	144 –	157	166	01101
146 –	146	158 –	173	182	01110
160 –	160	174 –	190	200	01111
176 –	176	191 –	209	220	10000
194 –	194	210 –	231	242	10001
214 –	214	232 –	254	267	10010
234 –	234	255 –	270	293	10011
258 –	258	—	—	322	10100

③ All settings not shown are equivalent to 00000.

Table 33-138. Size 6 Current Range

Column A Service Factor 1.15 to 1.25		Column B Service Factor 1.0		Trip Rating Amperes	DIP Switch Setting ④ (Positions) (54321)
Min.	Max.	Min.	Max.		
38.3 –	41.9	41.7 –	45.6	47.9	00000
42.0 –	46.1	45.7 –	50.1	52.5	00001
46.2 –	51.0	50.2 –	55.5	57.7	00010
51.1 –	55.9	55.6 –	60.8	63.9	00011
56.0 –	61.7	60.9 –	67.1	70.0	00100
61.8 –	67.5	67.2 –	73.4	77.3	00101
67.6 –	74.9	73.5 –	81.4	84.5	00110
75.0 –	82.3	81.5 –	89.5	93.7	00111
82.4 –	90.3	89.6 –	98.2	103	01000
90.4 –	99.9	98.3 –	108	113	01001
100 –	109	109 –	118	125	01010
110 –	120	119 –	130	137	01011
121 –	132	131 –	143	151	01100
133 –	145	144 –	157	166	01101
146 –	159	158 –	173	182	01110
160 –	175	174 –	190	200	01111
176 –	193	191 –	209	220	10000
194 –	213	210 –	231	242	10001
214 –	233	232 –	254	267	10010
234 –	257	255 –	279	293	10011
258 –	282	280 –	307	322	10100
283 –	311	308 –	338	354	10101
312 –	342	339 –	372	390	10110
343 –	376	373 –	409	429	10111
377 –	414	410 –	450	471	11000
415 –	456	451 –	496	519	11001
457 –	501	497 –	540	571	11010
502 –	540	—	—	628	11011

④ All settings not shown are equivalent to 00000.

Short Circuit Ratings

Table 33-139. Short-Circuit Ratings

Short-Circuit Protective Device (SCPD)	Max. Rating (SCPD)	Circuit Breaker Interrupting Rating	Short-Circuit Withstand Rating		Typical Disconnect Device
			Current	Voltage	
Size 1					
Class H Fuse	60A	—	5,000A	600V	30A DS Sw.
Class J, R or T Fuse	60A	—	100,000A 50,000A	480V 600V	30A DS Sw.
			65,000A	600V	100A FD-K Molded Case Sw.
Magnetic Only ① Type CB ②	3A	—	100,000A 25,000A	480V 600V	HMCP HMCPS
	7A	—	100,000A 25,000A	480V 600V	HMCPS
	15A	—	100,000A 25,000A	480V 600V	HMCP
	30A	—	100,000A 25,000A	480V 600V	HMCP
Thermal Magnetic Type CB ③	50A	65,000A 25,000A	65,000A 25,000A	480V 600V	HFD
		100,000A 35,000A	100,000A 35,000A	480V 600V	FDC
Magnetic Only Type CB plus CL ④	30A	—	100,000A	600V	HMCP plus CL
Thermal/Mag. Type CB plus CL ⑤	50A	150,000A	100,000A	600V	HFD plus CL
Size 2					
Class H Fuse	100A	—	5,000A	600V	60A DS Sw.
Class J, R or T Fuse	100A	—	100,000A 50,000A	480V 600V	60A DS Sw.
			65,000A	600V	100A FD-K Molded Case Sw.
Magnetic Only ① Type CB ②	50A	—	100,000A 25,000A	480V 600V	HMCP
Thermal Magnetic Type CB ③	90A	65,000A 25,000A	65,000A 25,000A	480V 600V	HFD
		100,000A 35,000A	100,000A 35,000A	480V 600V	FDC
Magnetic Only Type CB plus CL ④	50A	—	100,000A	600V	HMCP plus CL
Thermal/Mag. Type CB plus CL ⑤	90A	150,000A	100,000A	600V	HFD plus CL
Size 3					
Class H Fuse	350A	—	5,000A	600V	100A DS Sw.
Class R Fuse	200A	—	100,000A 65,000A	480V 600V	100A FD-K Molded Case Sw.
Class J or T Fuse	200A	—	100,000A 65,000A	480V 600V	100A FD-K Molded Case Sw.
Magnetic Only ① Type CB ②	200A	—	100,000A 25,000A	480V 600V	HMCP
Thermal Magnetic	150A	65,000A 25,000A	65,000A 25,000A	480V 600V	HFD
		100,000A 35,000A	100,000A 35,000A	480V 600V	FDC
Magnetic Only Type CB plus CL ④	100A	—	100,000A	600V	HMCP plus CL
Thermal/Mag. Type CB plus CL ⑤	150A	150,000A	100,000A	600V	HFD plus CL

Short-Circuit Protective Device (SCPD)	Max. Rating (SCPD)	Circuit Breaker Interrupting Rating	Short-Circuit Withstand Rating		Typical Disconnect Device
			Current	Voltage	
Size 4					
Class H Fuse	500A	—	10,000A	600V	200A DS Sw.
Class J Fuse	400A	—	100,000A 65,000A	480V 600V	250A JD-K Molded Case Sw.
Class R or Class T Fuse	400A	—	100,000A 65,000A	480V 600V	250A JD-K Molded Case Sw.
Magnetic Only ① Type CB ②	150A	—	100,000A 50,000A	480V 600V	HMCP
Thermal Magnetic Type CB ③	250A	100,000A 35,000A	100,000A 50,000A	480V 600V	JDC
		65,000A 25,000A	65,000A 25,000A	480V 600V	HJD
Magnetic Only Type CB plus CL ④	150A	—	100,000A	600V	HMCP plus CL
Size 5					
Class H Fuse	600A	—	10,000A	600V	400A KD-K Molded Case Sw.
Class J, R or T Fuse	600A	—	100,000A	600V	
Magnetic Only ① Type CB ②	250A	—	100,000A 25,000A	480V 600V	HMCP
	400A	—	100,000A 25,000A	480V 600V	
Thermal Magnetic Type CB ③	400A	65,000A 50,000A 35,000A	65,000A 100,000A 25,000A	480V 600V 600V	HFD KDC HKD
Size 6					
Class J, R or T Fuse	600A	—	100,000A 65,000A	480V 600V	600A LD-K Molded Case Sw.
Class L Fuse	800A	—	100,000A 65,000A	480V 600V	600A LD-K Molded Case Sw.
Magnetic Only ① Type CB ②	600A	—	100,000A 25,000A	480V 600V	HMCP
	800A	—	65,000A 25,000A	480V 600V	Magnetic Only HMCP
Thermal Magnetic Type CB ③	600A	65,000A 25,000A	65,000A 35,000A	480V 600V	HLD
	800A	50,000A 25,000A	65,000A 25,000A	480V 600V	Thermal Magnetic HMC
Thermal/Mag. with CL ⑤	800A	200,000A	100,000A	600V	NB Tri-Pac

① Instantaneous adjustable trip.
② Circuit breaker.
③ Inverse time circuit breaker.
④ Instantaneous adjustable trip with current limiting attachment.
⑤ Inverse time with built-in current limiting attachment.

DeviceNet™ Communications Module

DeviceNet Module

The DeviceNet Communications module (Catalog Number WPONIDNA) is designed to plug into the Advantage with the attached cable and plug. The module can be snapped onto the top or bottom of the Advantage unit. It can also be mounted separately using the mounting plate assembly (Catalog Number WPONIBASE). The module provides DeviceNet users with the ability to control and monitor the functions of the Advantage system at 125, 250 or 500 kbaud. A connector is provided so that a HAND/OFF/AUTO hard contact may be used to selectively enable or disable the output of the control functions from the module without affecting its ability to monitor. A "Feedback" input is provided so that the state of an auxiliary contact may be read over the DeviceNet network.

Three bicolor LEDs indicate:

- DeviceNet address
- Network status (including connected, not connected, not powered)
- Module status (including normal operation, minor fault, needs commissioning)

Table 33-140. DeviceNet Interface

Description	Catalog Number	Price U.S. $
DeviceNet Interface Module	**WPONIDNA**	450.00
Mounting Plate Assembly	**WPONIBASE**	21.40

Note: See **Page 33-99** for WPONI Network Interface.

Type W Auxiliary Contact Modules

- Provides four separate contact sets which wire vertically and are color coded; black designates NC and silver designated NO.
- Up to two auxiliary contact modules can be mounted for a total of up to eight contact sets.
- Provides circuit isolation (no polarity restrictions) and single break bifurcated contacts.
- Common design fits all Sizes 1 – 6.

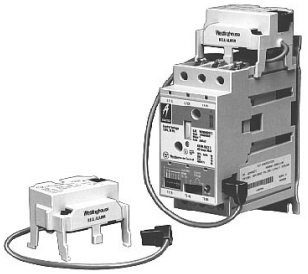
Table 33-141. Ratings

Voltage	Make	Break
NEMA A600 — 120 – 600V AC	7200 VA	720 VA
NEMA Q300 — 125 – 300V DC	69 VA	69 VA

Table 33-142. Auxiliary Contact Modules

Description	Catalog Number	Price U.S. $
2NO, 2NC	**W22**	118.00
3NO, 1NC	**W31**	118.00
4NO	**W40**	118.00
4NC	**W04**	118.00
1NO, 3NC	**W13**	118.00
1NO, 1NC and 2 Tie Points	**W11T**	118.00

Bell Alarm Module



Bell Alarm Module

- Simple snap-on mounting — see mounting examples in **Figure 33-30**.
- Isolated NO and NC contacts (1 each)
- Plugs into Reset port
- Remote electrical Reset wired to Catalog Number WBELL module

Table 33-143. Ratings

Form C Contact Ratings Maximum Amperes — 120V AC		Catalog Number	Price U.S. $
Make	Break		
2880 VA	480 VA	**WBELL**	41.25
Continuous Current Rating: 5A			

Transformer Pilot Light Kits

Table 33-144. Transformer Pilot Light Kits

Voltage	Color	Legend Plate	Catalog Number	Price U.S. $	Replacement Part	Price U.S. $
120	Red	RUN	**PLK1R**	101.00	99-3590-1	101.00
240	Red	RUN	**PLK2R**	101.00	99-3590-3	101.00
480	Red	RUN	**PLK4R**	101.00	99-3590-6	101.00
600	Green	OFF	**PLK1G**	101.00	99-3590-8	101.00

Discount Symbol **1CD1C**

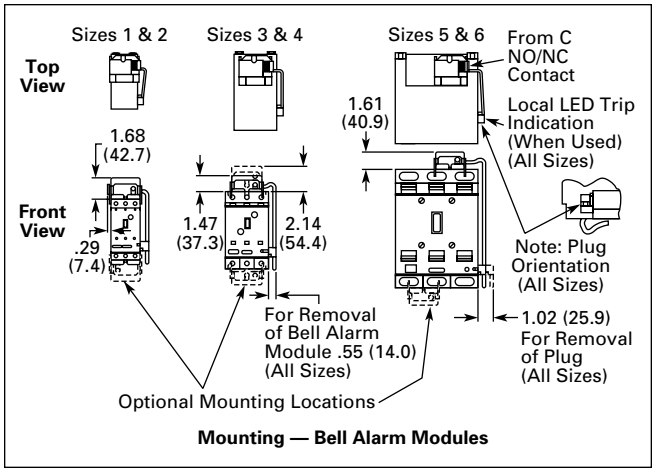
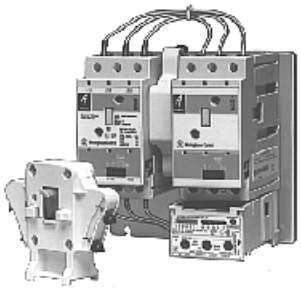


Figure 33-30. Approximate Dimensions in Inches (mm)

Mechanical Interlock Kits



Installed Mechanical Interlock Kit

- Prevents closing of one contactor of a reversing or multi-speed controller until the opposite contactor is completely open.
- Lever type mechanism assures positive action.
- Electrical interlocking contacts included — two NC contacts.

Note: These kits cannot be field installed on reversing starters.

Table 33-145. Mechanical Interlock Kits

Orientation	NEMA Size	Catalog Number	Price U.S. $
Horizontal	1 – 6	**WM16H**	43.75
Vertical	1, 2	**WM12V**	43.75
	3, 4	**WM34V**	73.50
	5	**WM55V**	393.00
	6	**WM66V**	393.00
Vertical	1 or 2 to 3 or 4	**WM23VR** ①	73.50
	3 or 4 to 5 or 6	**WM45VR** ②	393.00
	5, 6	**WMBBV** ③	715.00

① Used to interlock a Size 1 or 2 to a Size 3 or 4 — mounts on right only.
② Used to interlock a Size 3 or 4 to a Size 5 or 6 — mounts on right only.
③ Interconnecting bus bars are furnished with the interlock.

Control Wire Ring/Spade Terminal Block

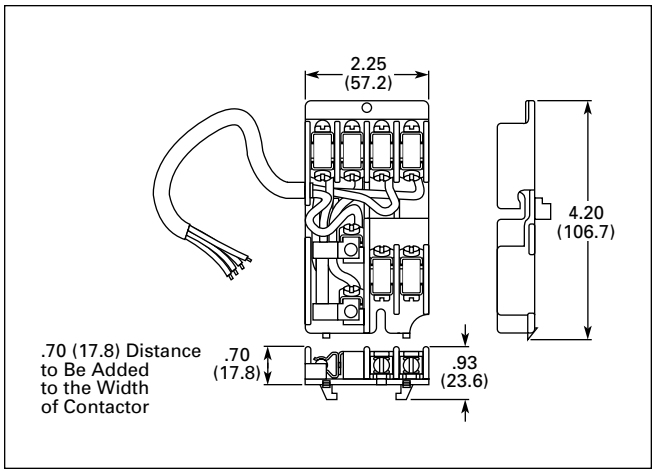


Figure 33-31. Approximate Dimensions in Inches (mm)

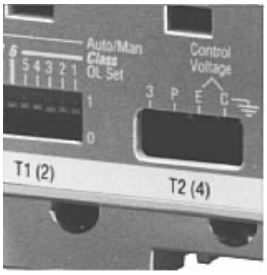
- For use with all Sizes 1 – 6.
- Provisions for ring or spade type lugs or stripped conductors.
- Bottom side pre-wired with color coded conductors.
- Side mounting on contactor identical to Type W auxiliary contact module mounting or can be mounted on Type W auxiliary contacts.
- Kit contains fuses for use with all size starters.

Table 33-146. Control Wire Terminal Block

Description	Catalog Number	Price U.S. $
Control Wire Terminal Block	**WTBF16**	73.50

Discount Symbol **1CD1C**

OL Selection DIP Switch Window



DIP Switch Window

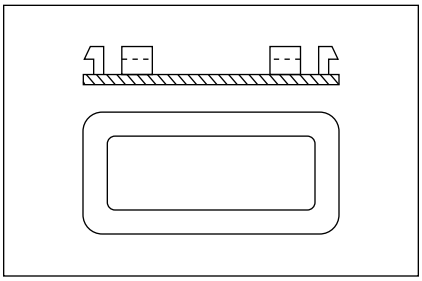


Figure 33-32. DIP Switch Window

- Simple snap-in installation
- Allows clear visibility of DIP switches
- Prevents unwanted tampering of DIP switch settings
- Once in must be pried out from rear
- One window supplied with each starter

Table 33-147. DIP Switch Window

Description	Catalog Number	Price U.S. $
DIP Switch Window, Package of 10	**WDIPSW10**	2.35

DIN Rail Adapter Kit

- Provides snap-on mounting on 35 mm DIN rail
- For use with Sizes 1 and 2 non-reversing contactors and starters

Table 33-148. DIN Rail Adapter Kit

Description	Catalog Number	Price U.S. $
DIN Rail Adapter Kit	**WDIN**	18.30

Internal Trip Indicator

Internal Trip Indicator

- Overload condition indication — indicated by blinking light
- Trip condition — indicated by solid light

Table 33-149. Trip Indicator

Description	Catalog Number	Price U.S. $
Internal Trip Indicator	**WLED**	11.00

Competitive Baseplate Kit

- Allows for direct retrofit of competitive non-reversing starters
- Eliminates the need for re-drilling and tapping of mounting holes
- Simple selection of competitive footprints

Table 33-150. Baseplate Kit

Description	Catalog Number	Price U.S. $
Sizes 1 and 2 Sizes 3 and 4	**WBASE12** **WBASE34**	31.75 31.75

Remote Reset and Trip Indicator Pushbutton

FWD/REV/OFF/AUTO Control

- OL condition indication
- Trip indication — OL phase-loss/unbalance and ground fault
- OL reset capability
- 10250T — for 30 mm mounting
- NEMA 4 oiltight rated
- Mount remotely up to 6 ft. away
- Unit completely assembled including legend plate
- Available also in reset-only form — no trip indication provided

Table 33-151. Remote Pushbuttons

Description	Catalog Number	Price U.S. $
Reset with Trip Indication		
2 ft. Cable	**WRSTL24**	82.50
6 ft. Cable	**WRSTL72**	86.00
15 ft. Cable	**WRSTL180**	98.50
Reset Only		
2 ft. Cable	**WRST24**	33.00
6 ft. Cable	**WRST72**	35.25
15 ft. Cable	**WRST180**	48.75
Conversion Kit Reset Only to Reset with Trip Indication	**WRLTT**	59.00
6 ft. Cable Only	**WRC72**	11.00
15 ft. Cable Only	**WRC180**	25.75
LED Replacement Bulb	**WRLT**	21.90

Renewal Parts

Table 33-152. Replacement Contact Kits

NEMA Size	Number of Poles	Catalog Number	Price U.S. $
1	3	**WCK13**	145.00
2	3	**WCK23**	200.00
3	3	**WCK33**	329.00
4	3	**WCK43**	690.00
5	3	**WCK53**	1,250.00
6	3	**WCK63**	3,200.00

Table 33-153. Replacement Coils

Coil Size	Voltage and Hz	Catalog Number	Price U.S. $
1 & 2	110/120V 60 Hz	**WCOIL12F**	63.50
3 & 4	110/120V 60 Hz	**WCOIL34F**	140.00
5 & 6	110/120V 60 Hz	**WCOIL56F**	394.50

Discount Symbol **1CD1C**

Full Voltage Pushbutton Control Module

Metering Module

The Advantage Control Modules (ACM) provide a cost-effective alternative to pushbuttons, selector switches, indicating lights, reset mechanisms, bell alarms and panel meters when used with the Advantage product line. Typical input/output control functions provided by panel mounted devices are conveniently packaged in a series of modules depending on application and complexity.

Sixteen styles cover applications ranging from:

- Full voltage non-reversing
- Full voltage reversing
- Full voltage multispeed
- Reduced voltage
- DeviceNet compatible

Modules exist for each application to provide the functions of:

- Status only
  - ❑ Indicating lights
  - ❑ Reset
- Status, START/STOP and RESET
- Status, HOA and RESET
- Status, START/STOP/HOA and RESET

An additional Metering Module replaces conventional ammeters (three-phase), replaces reset mechanisms and displays trip cause and data, control voltage and status.

This Metering Module can be used independently or in conjunction with any of the ACMs. An extra plug connection is available on the rear of each ACM to accept the Metering Module input.

The ACM family has been designed to save:

- Panel space (versus conventional pushbuttons, selector switches and indicating lights)
- Mounting and assembly labor
- Wiring and installation time

Regardless of the configuration, installation requires mounting only one 2.25 x 3.5 inch module, substantially reducing space requirements. Fitting a standard Greenlee punch and die set, Greenlee #60071, installation is accomplished with only two screws.

ACMs provide savings in wiring costs as well. Regardless of the complexity of the application, wiring is reduced to a single plug-in cable, see photo at left.

Communication is not restricted by use of the Advantage Control Modules. An extra plug connection is available on the rear of the ACM or Metering Module to allow a WPONIDNA or WPONI Communications module to be plugged in.

Full Voltage and Reduced Voltage Control Modules

Status Only

- 4 LEDs indicate that the motor is OFF, Running, Tripped or in Alarm mode (motor current is above the trip current setting)
- Includes RESET button

START/STOP

- Motor START/STOP controlled by START and STOP buttons
- Includes all features of Status Only module

HOA Selector Switch with START/STOP

- In HAND mode, motor will start and stop in response to START/STOP pushbuttons
- In AUTO mode, motor will run in response to remote signal
- Includes all features of Status Only module

ON/OFF/AUTO Selector Switch

- Motor will run in ON mode and not in the OFF mode
- In AUTO mode the motor will run in response to a remote signal
- Includes all features of Status Only module

Reduced Voltage Control Modules

The four reduced voltage pushbutton control modules provide control using two to four starters and/or contactors. The faceplates are identical to the full voltage modules, and the pushbuttons all perform the same functions. The module is programmed for the type of reduced voltage starter which sets the sequence of contact open and closing.

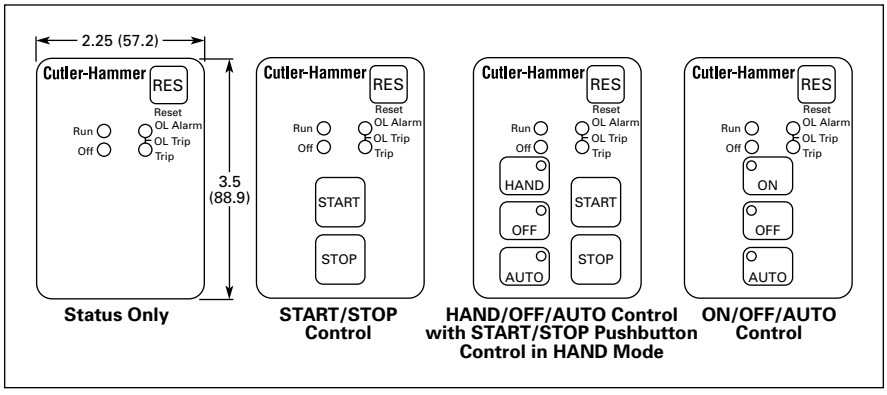


Figure 33-33. Full Voltage and Reduced Voltage Control Modules

33

Reversing and 2-Speed Pushbutton Modules

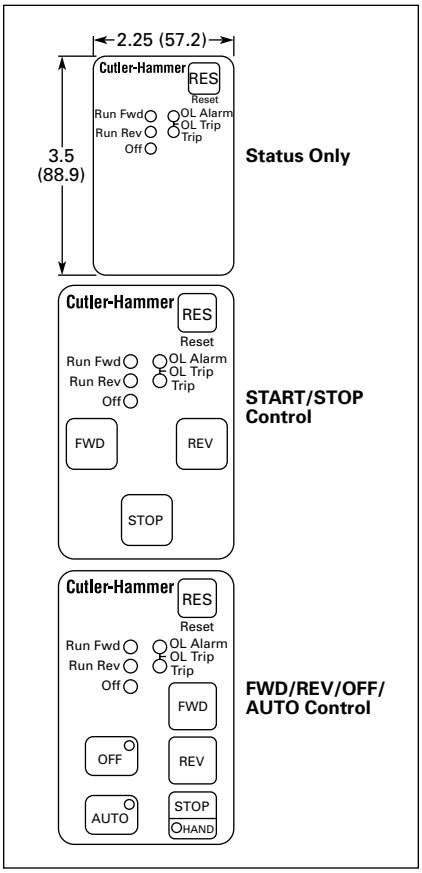


Figure 33-34. Reversing and 2-Speed Pushbutton Module

ACM Specifications

- Input supply requirements: 120V AC (supplied by the Advantage motor controller)
- Max. distance from Advantage motor controller: 6 ft. (1.83m)
- Operating frequency: 50 or 60 Hz
- Operating temperature: -20° to 70°C
- Storage temperature: -20° to 85°C
- Humidity: 0 to 95%, non-condensing
- Remote input wire size: 18 – 14 AWG
- Maximum distance between remote pushbuttons and ACM: 1000 ft. (304.8m)
- Cutout dimensions: 2.25 x 3.5 inches (57.2 x 88.9 mm) (see above). The cut-out can be made using a Greenlee rectangular punch #600710
- Enclosure type: NEMA 1 or 12, when properly installed

Status Only

- 5 LEDs which indicate that the motor is OFF, running forward (FAST), running reverse (SLOW), tripped or in alarm mode
- Includes RESET button

FORWARD (FAST)/REVERSE (SLOW)/STOP

- Pushbuttons control whether motor is running forward (FAST), running reverse (SLOW) or stopped
- Includes all features of Status Only module

FWD/REV/OFF/AUTO

- In AUTO mode, motor is running forward (FAST), running reverse (SLOW) or OFF in response to a remote signal
- All features of FORWARD/REVERSE/ STOP module

Note: For 2-speed modules, FAST replaces FWD and SLOW replaces REV.

Metering Module

The Advantage Metering Module monitors status of a motor along with any of the pushbutton modules. It may be plugged into the pushbutton control module, and communicates to the starter through it, or plugged directly into the starter when a pushbutton control module is not used.

The four digit display will show the current in each phase, control voltage or cause of trip. The STEP button may be pressed to step through these values, and the five LEDs will indicate which value is being displayed. It is also equipped with a reset button and Trip Lockout LED.

Table 33-154. Control Modules/Accessories

Description	Catalog Number	Price U.S. $
Full Voltage		
Status Only with Reset	**WPBFV1**	153.00
START/STOP	**WPBFV2**	225.00
START/STOP/HOA	**WPBFV3**	277.00
ON/OFF/AUTO	**WPBFV4**	202.00
LOCAL/OFF/REMOTE with Lockable ACM ①	**WPBFV5** ①	297.00
LOCAL/OFF/REMOTE with Network Health ①	**WPBFV7** ①	297.00
Reversing		
Status Only with Reset	**WPBR1**	225.00
FWD/REV/STOP	**WPBR2**	324.00
FWD/REV/STOP/HOA	**WPBR3**	374.00
2-Speed		
Status Only with Reset	**WPB2S1**	225.00
FAST/SLOW/STOP	**WPB2S2**	324.00
FAST/SLOW/STOP/HOA	**WPB2S3**	374.00
Reduced Voltage		
Status Only with Reset	**WPBRV1**	160.00
START/STOP	**WPBRV2**	225.00
START/STOP/HOA	**WPBRV3**	277.00
ON/OFF/AUTO	**WPBRV4**	211.00
Metering Module	**WMETER**	362.00
10 ft. Interconnect Cable (3m)	**WACM10**	95.00
6 ft. Interconnect Cable (1.8m)	**WACM6**	25.75
3 ft. Interconnect Cable (.9m)	**WACM3**	21.90
1 ft. Interconnect Jumper (.3m)	**WACM1**	18.30

① The WPBFV5 and WPBFV7 are DeviceNet® only. They can only be used when an active network is connected.

Discount Symbol **1CD1C**

Non-reversing Contactors, NEMA Sizes 1 – 6

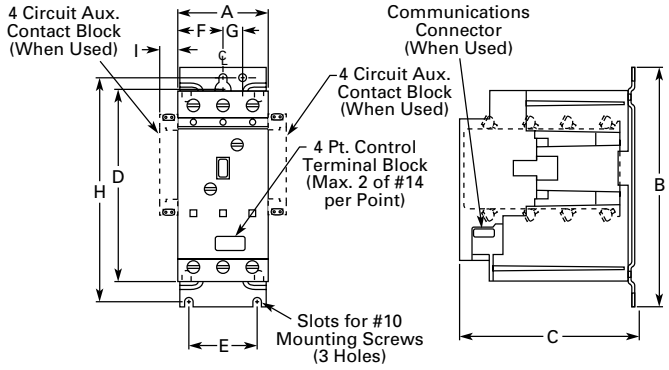


Figure 1
Sizes 1 and 2 Contactor

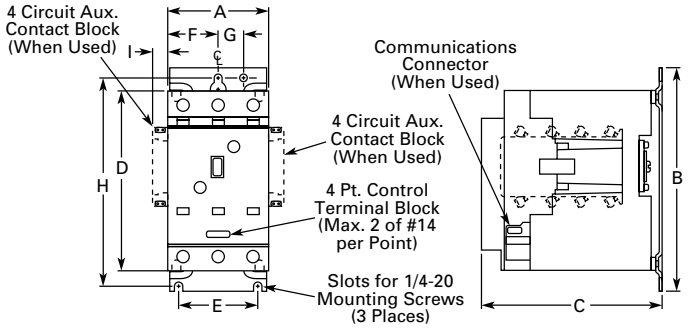


Figure 2
Sizes 3 and 4 Contactor

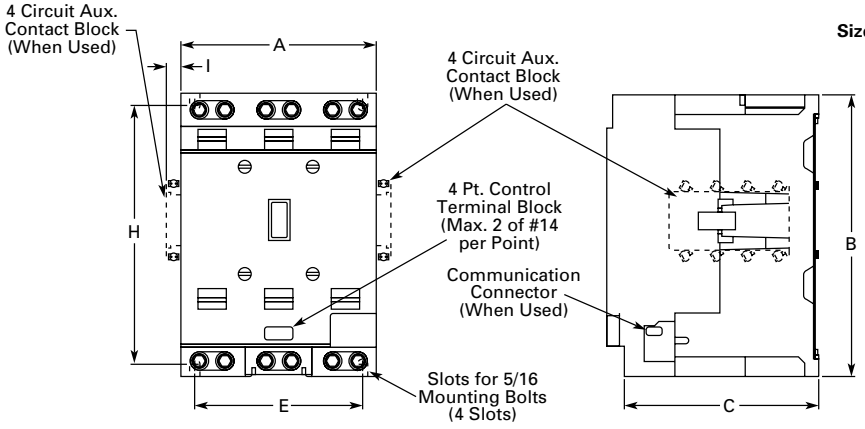


Figure 3
Sizes 5 and 6 Contactor

Figure 33-35. Approximate Dimensions in Inches and Shipping Weights

Table 33-155. Catalog Number W201 Non-reversing Contactors

NEMA Size	Number of Poles	Figure Number	Mounting Screws		Dimensions in Inches (mm)									Ship. Wt. Lbs. (kg)
			Number	Size	Wide A	High B	Deep C	D	E	F	G	H	I	
1, 2	3	1	3	#10	2.50 (63.5)	6.50 (165.1)	4.84 (122.9)	5.12 (130.0)	1.88 (47.8)	1.25 (31.8)	.75 (19.1)	6.00 (152.4)	.52 (13.2)	2 (.9)
3, 4	3	2	3	1/4-20	3.68 (93.5)	8.00 (203.2)	6.49 (164.8)	6.45 (163.8)	2.80 (71.1)	1.84 (46.7)	.93 (23.6)	7.50 (190.5)	.52 (13.2)	6 (2.7)
5, 6	3	3	4	5/16	7.07 (179.6)	10.08 (256.0)	7.64 (194.1)	—	6.00 (152.4)	—	—	9.20 (233.7)	.50 (12.7)	30 (13.6)

Horizontal Reversing, Open Contactors, NEMA Sizes 1 – 6

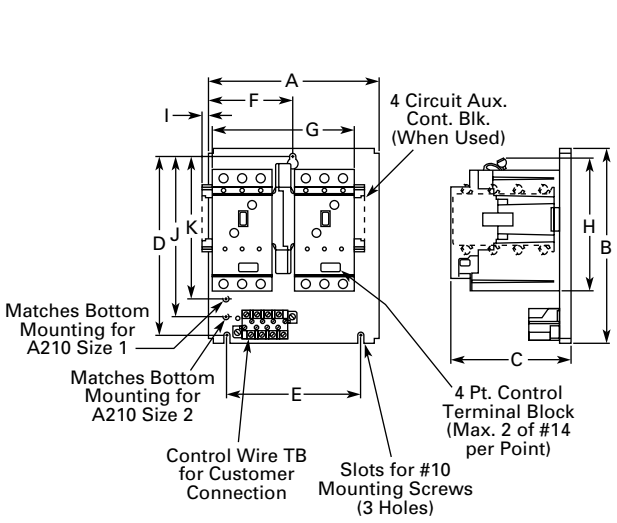


Figure 1
Sizes 1 and 2 Horizontal Reversing Contactor

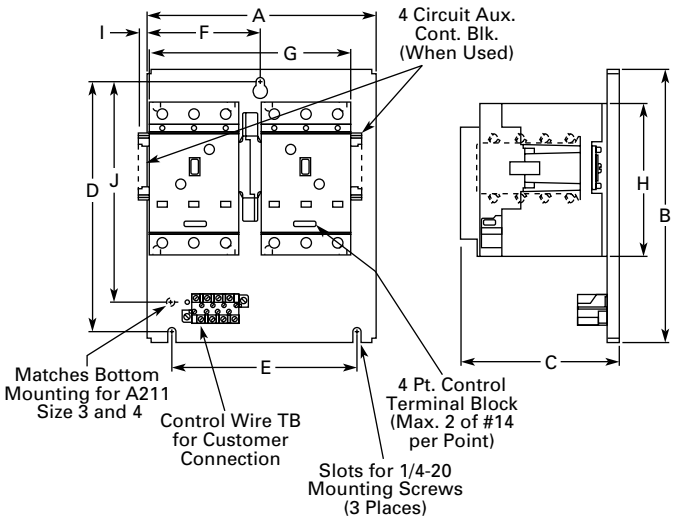


Figure 2
Sizes 3 and 4 Horizontal Reversing Contactor

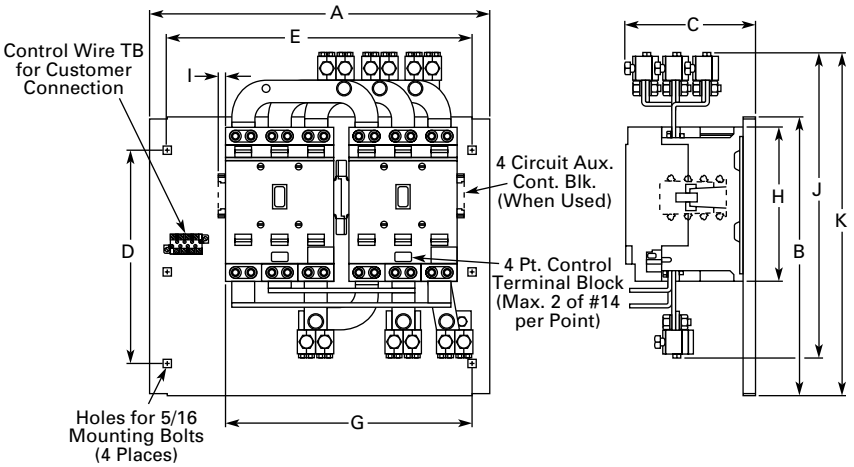


Figure 3
Sizes 5 and 6 Horizontal Reversing Contactor

Figure 33-36. Approximate Dimensions in Inches and Shipping Weights

Note: For all Sizes 1 – 6, factory furnishes the control wiring between the forward and reverse contactors, and the control wire terminal block for customer connection.

Table 33-156. Catalog Number W211 Horizontal Reversing Contactors

NEMA Size	Number of Poles	Figure Number	Mounting Screws		Dimensions in Inches (mm)											Ship. Wt. Lbs. (kg)
			Number	Size	Wide A	High B	Deep C	D	E	F	G	H	I	J	K	
1, 2	3 x 3	1	3	#10	7.13 (181.1)	8.05 (204.5)	5.09 (129.3)	7.50 (190.5)	5.69 (144.5)	3.56 (90.4)	6.00 (152.4)	5.53 (140.5)	.33 (8.4)	6.75 (171.5)	6.00 (152.4)	6 (2.7)
3, 4	3 x 3	2	3	1/4-20	9.76 (247.9)	11.37 (288.8)	6.76 (171.7)	10.50 (266.7)	8.00 (203.2)	4.88 (124.0)	8.36 (212.3)	6.45 (163.8)	.45 (11.4)	9.25 (235.0)	—	16 (7.3)
5	3 x 3	3	4	5/16	22.24 (564.9)	18.24 (463.3)	8.91 (226.3)	14.00 (355.6)	20.00 (508.0)	—	15.15 (384.8)	10.08 (256.0)	.50 (12.7)	19.95 (506.7)	22.47 (570.7)	80 (36.3)
6	3 x 3	3	4	5/16	22.24 (564.9)	18.24 (463.3)	8.65 (219.7)	14.00 (355.6)	20.00 (508.0)	—	16.18 (411.0)	10.08 (256.0)	.50 (12.7)	19.76 (501.9)	22.28 (565.9)	80 (36.3)

Vertical Reversing, Open Contactors, NEMA Sizes 1 – 6

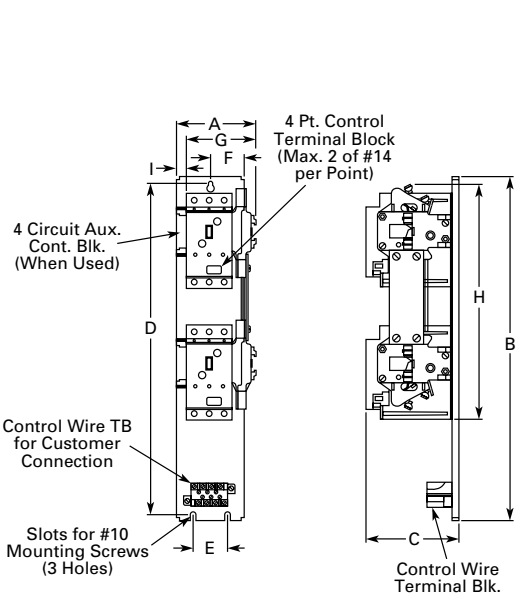


Figure 1
Sizes 1 and 2 Vertical Reversing Contactor

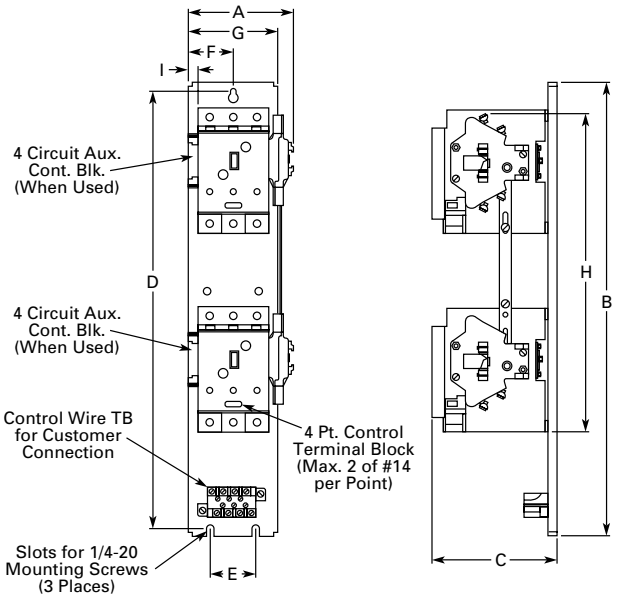


Figure 2
Sizes 3 and 4 Vertical Reversing Contactor

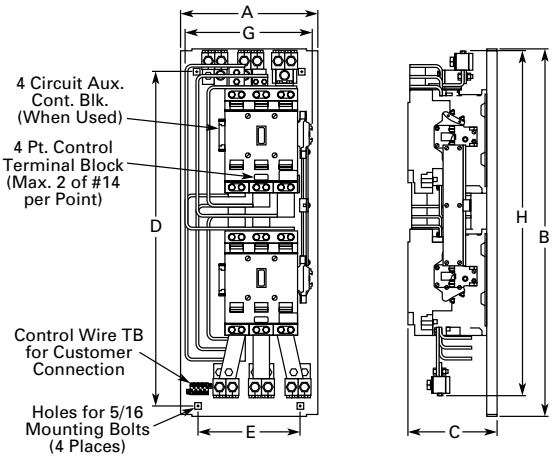


Figure 3
Sizes 5 and 6 Vertical Reversing Contactor

Figure 33-37. Approximate Dimensions in Inches and Shipping Weights

Note: For all Sizes 1 – 6, factory furnishes the control wiring between the forward and reverse contactors, and the control wire terminal block for customer connection.

Table 33-157. Catalog Number W251 Vertical Reversing Contactors

NEMA Size	Number of Poles	Figure Number	Mounting Screws		Dimensions in Inches (mm)									Ship. Wt. Lbs. (kg)
			Number	Size	Wide A	High B	Deep C	D	E	F	G	H	I	
1, 2	3 x 3	1	3	#10	4.27 (108.5)	18.50 (469.9)	5.09 (129.3)	18.00 (457.2)	1.88 (47.8)	1.80 (45.7)	3.73 (94.7)	12.65 (321.3)	.52 (13.2)	7 (3.2)
3, 4	3 x 3	2	3	1/4-20	5.42 (137.7)	25.13 (638.3)	6.76 (171.7)	24.25 (616.0)	2.88 (73.2)	2.31 (58.7)	4.62 (117.3)	16.94 (430.3)	.52 (13.2)	17 (7.7)
5	3 x 3	3	4	5/16	13.24 (336.3)	34.94 (887.5)	8.64 (219.5)	32.00 (812.8)	10.00 (254.0)	—	12.04 (305.8)	33.29 (845.6)	—	80 (36.3)
6	3 x 3	3	4	5/16	13.24 (336.3)	34.94 (887.5)	8.64 (219.5)	32.00 (812.8)	10.00 (254.0)	—	12.04 (305.8)	33.16 (842.3)	—	80 (36.3)

Non-reversing Starters, NEMA Sizes 1 – 6

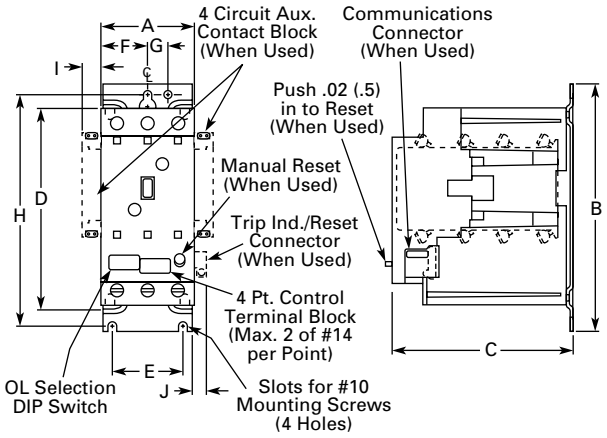


Figure 1
Sizes 1 and 2 Starter

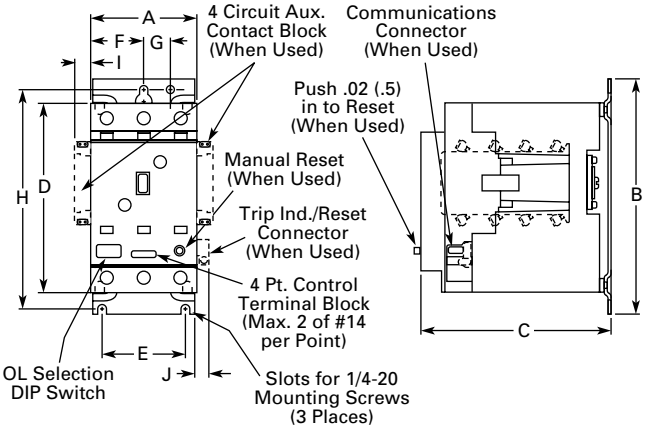


Figure 2
Sizes 3 and 4 Starter

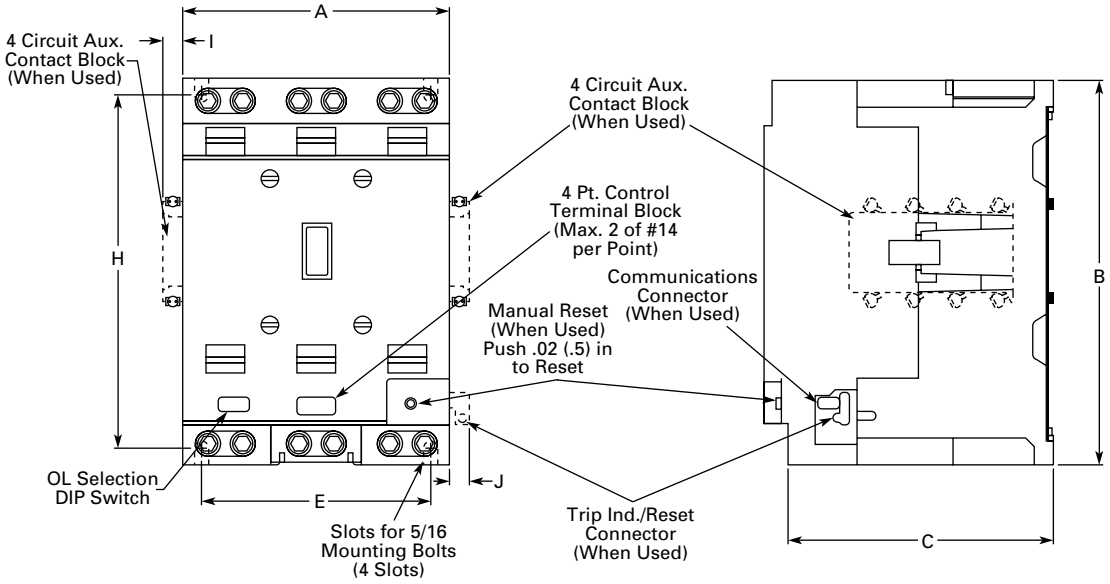

A
I
4 Circuit Aux. Contact Block (When Used)
4 Circuit Aux. Contact Block (When Used)
4 Pt. Control Terminal Block (Max. 2 of #14 per Point)
Communications Connector (When Used)
Manual Reset (When Used) Push .02 (.5) in to Reset
H
B
OL Selection DIP Switch
E
J
Slots for 5/16 Mounting Bolts (4 Slots)
Trip Ind./Reset Connector (When Used)
C

Figure 3
Sizes 5 and 6 Starter

Figure 33-38. Approximate Dimensions in Inches and Shipping Weights

Table 33-158. Catalog Number W200 Non-reversing Starters

NEMA Size	Number of Poles	Figure Number	Mounting Screws		Dimensions in Inches (mm)										Ship. Wt. Lbs. (kg)
			Number	Size	Wide A	High B	Deep C	D	E	F	G	H	I	J	
1, 2	3	1	3	#10	2.50 (63.5)	6.50 (165.1)	4.96 (126.0)	5.12 (130.0)	1.88 (47.8)	1.25 (31.8)	.75 (19.1)	6.00 (152.4)	.52 (13.2)	.29 (7.4)	2 (.9)
3, 4	3	2	3	1/4-20	3.68 (93.5)	8.00 (203.2)	6.54 (166.1)	6.45 (163.8)	2.80 (71.1)	1.84 (46.7)	.93 (23.6)	7.50 (190.5)	.52 (13.2)	.32 (8.1)	6 (2.7)
5, 6	3	3	4	5/16	7.07 (179.6)	10.08 (256.0)	7.64 (194.1)	—	6.00 (152.4)	—	—	9.20 (233.7)	.50 (12.7)	.46 (11.7)	30 (13.6)

Horizontal Reversing, Open Starters, NEMA Sizes 1 – 6

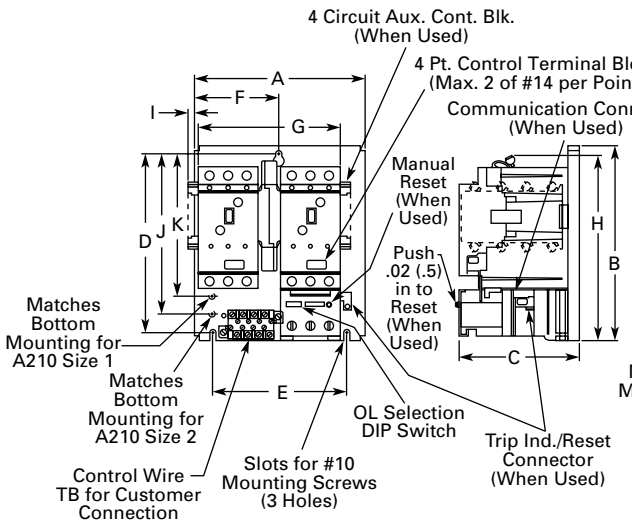


Figure 1
Sizes 1 and 2 Horizontal Reversing Contactor

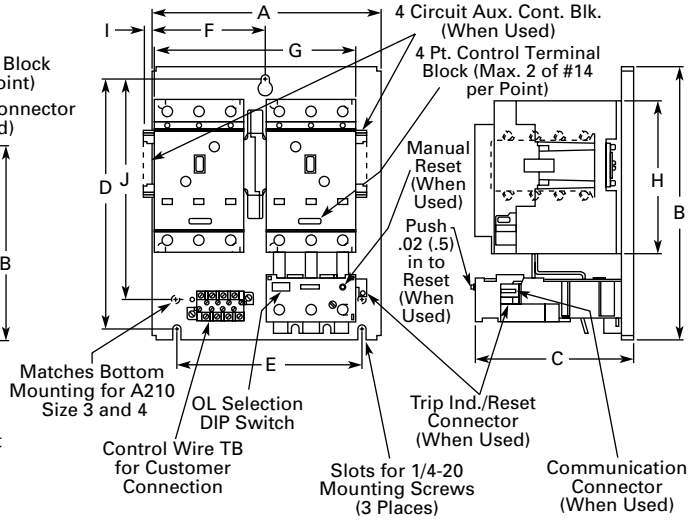


Figure 2
Sizes 3 and 4 Horizontal Reversing Contactor

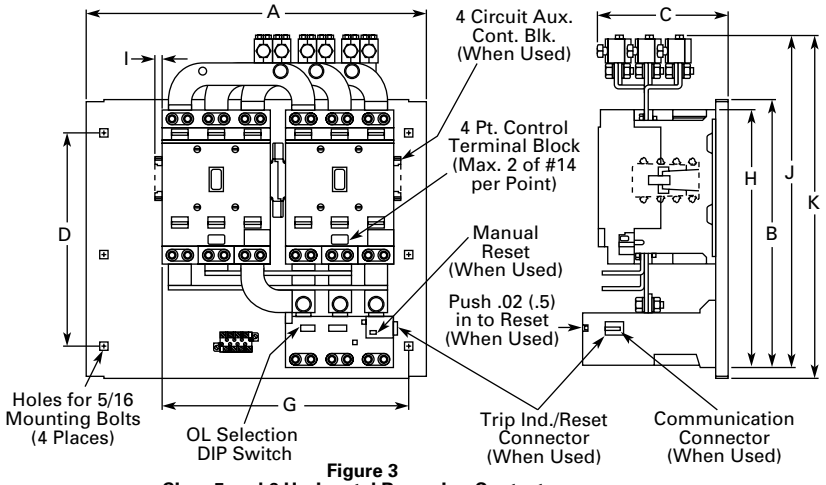


Figure 3
Sizes 5 and 6 Horizontal Reversing Contactor

Figure 33-39. Approximate Dimensions in Inches and Shipping Weights

Note: For all Sizes 1 – 6, factory furnishes the control wiring between the forward and reverse contactors, and the control wire terminal block for customer connection.

Table 33-159. Catalog Number W210 Horizontal Reversing Starters

NEMA Size	Number of Poles	Figure Number	Mounting Screws		Dimensions in Inches (mm)											Ship. Wt. Lbs. (kg)
			Number	Size	Wide A	High B	Deep C	D	E	F	G	H	I	J	K	
1, 2	3 x 3	1	3	#10	7.13 (181.1)	8.05 (204.5)	5.25 (133.4)	7.50 (190.5)	5.69 (144.5)	3.56 (90.4)	6.00 (152.4)	7.62 (192.5)	.33 (8.4)	6.75 (171.5)	6.00 (152.4)	7 (3.2)
3, 4	3 x 3	2	3	1/4-20	9.76 (247.9)	11.37 (288.8)	6.81 (173.0)	10.50 (266.7)	8.00 (203.2)	4.88 (124.0)	8.47 (215.1)	9.79 (248.7)	.45 (11.4)	9.25 (235.0)	—	18 (8.2)
5	3 x 3	3	4	5/16	22.24 (564.9)	18.24 (463.3)	8.91 (226.3)	14.00 (355.6)	20.00 (508.0)	—	15.28 (388.1)	16.82 (427.2)	.50 (12.7)	21.76 (552.7)	22.47 (570.7)	85 (38.6)
6	3 x 3	3	4	516	22.24 (564.9)	18.24 (463.3)	8.65 (219.7)	14.00 (355.6)	20.00 (508.0)	—	15.28 (388.1)	16.82 (427.2)	.50 (12.7)	21.57 (547.9)	22.28 (565.9)	85 (38.6)

Vertical Reversing, Open Starters, NEMA Sizes 1 – 6

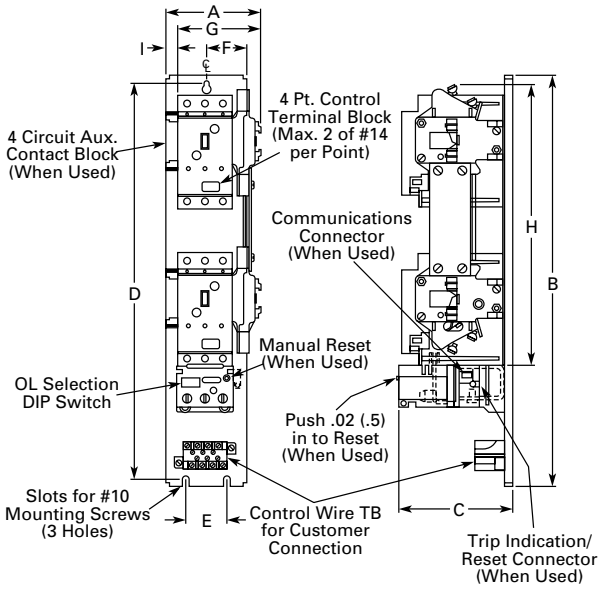


Figure 1
Sizes 1 and 2 Vertical Reversing Starter

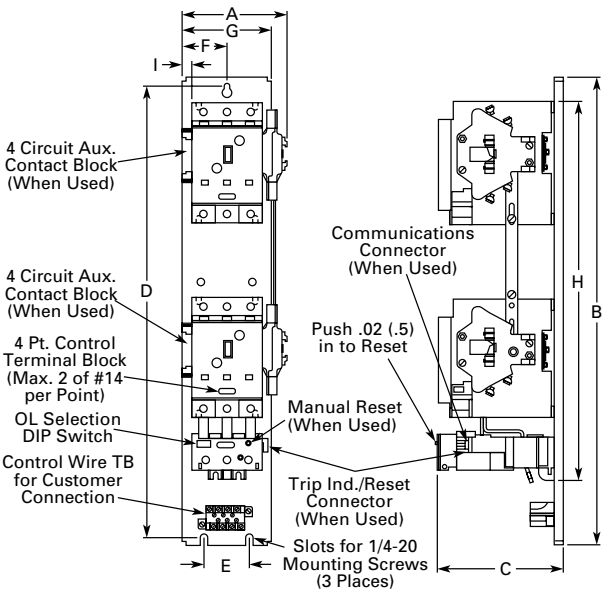


Figure 2
Sizes 3 and 4 Vertical Reversing Starter

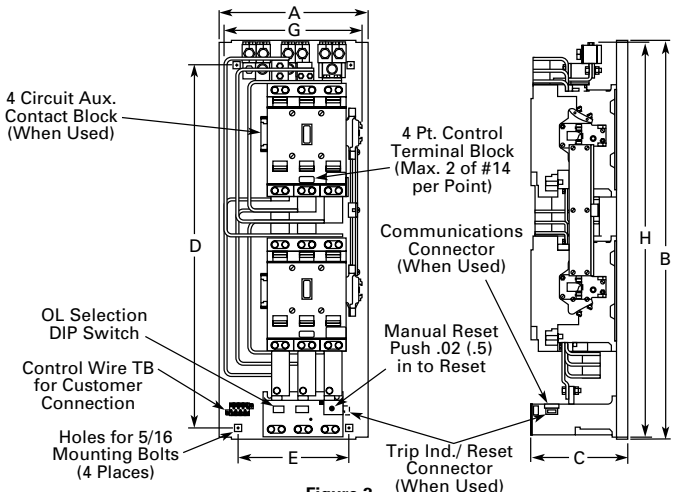

A
G
4 Circuit Aux. Contact Block (When Used)
4 Pt. Control Terminal Block (Max. 2 of #14 per Point)
D
Communications Connector (When Used)
H
B
OL Selection DIP Switch
Manual Reset Push .02 (.5) in to Reset
Control Wire TB for Customer Connection
Holes for 5/16 Mounting Bolts (4 Places)
E
Trip Ind./ Reset Connector (When Used)
C

Figure 3
Sizes 5 and 6 Vertical Reversing Starter

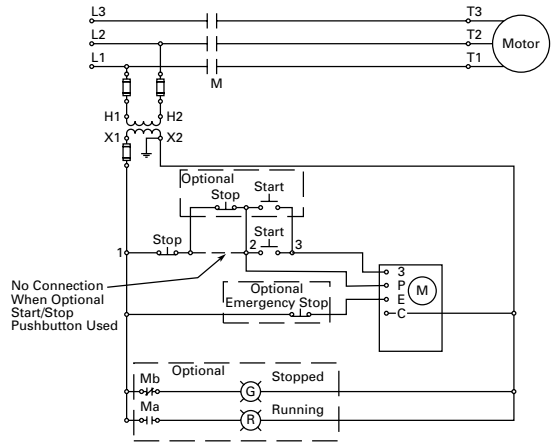
Figure 33-40. Approximate Dimensions in Inches and Shipping Weights

Note: For all Sizes 1 – 6, factory furnishes the control wiring between the forward and reverse contactors, and the control wire terminal block for customer connection.

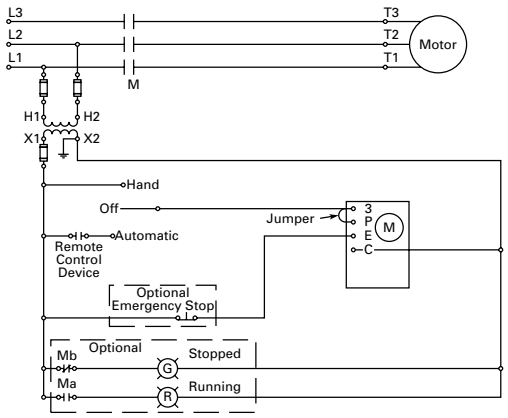
Table 33-160. Catalog Number W250 Vertical Reversing Starters

NEMA Size	Number of Poles	Figure Number	Mounting Screws		Dimensions in Inches (mm)									Ship. Wt. Lbs. (kg)
			Number	Size	Wide A	High B	Deep C	D	E	F	G	H	I	
1, 2	3 x 3	1	3	#10	4.27 (108.5)	18.50 (469.9)	5.25 (133.4)	18.00 (457.2)	1.88 (47.8)	1.80 (45.7)	3.73 (94.7)	14.72 (373.9)	.52 (13.2)	7.5 (3.4)
3, 4	3 x 3	2	3	1/4-20	5.42 (137.7)	25.13 (638.3)	6.81 (173.0)	24.25 (616.0)	2.88 (73.2)	2.31 (58.7)	4.62 (117.3)	20.28 (515.1)	.52 (13.2)	19.0 (8.6)
5	3 x 3	3	4	5/16	13.24 (336.3)	34.94 (887.5)	8.64 (219.5)	32.00 (812.8)	10.00 (254.0)	—	12.04 (305.8)	34.78 (883.4)	—	85.0 (38.6)
6	3 x 3	3	4	516	13.24 (336.3)	34.94 (887.5)	8.64 (219.5)	32.00 (812.8)	10.00 (254.0)	—	12.04 (305.8)	34.59 (878.6)	—	85.0 (38.6)

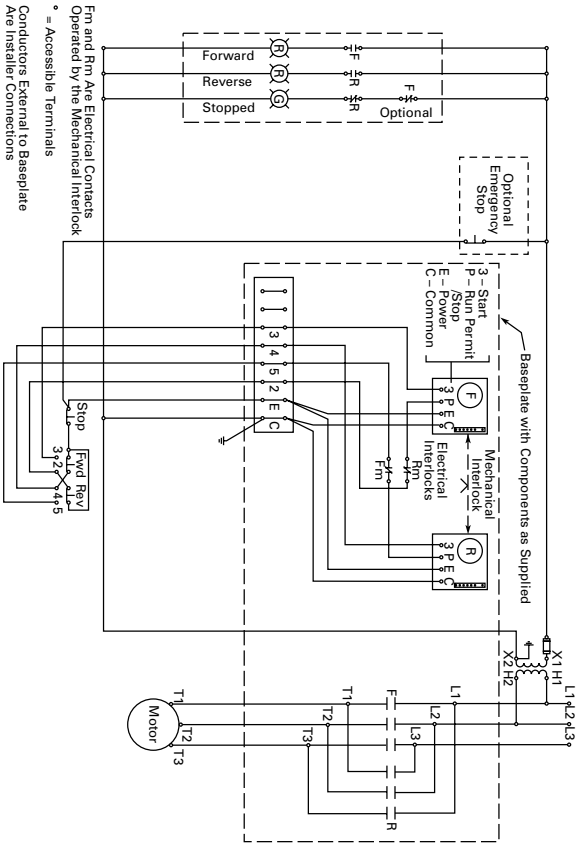
Non-reversing and Reversing Contactors, NEMA Sizes 1 – 6



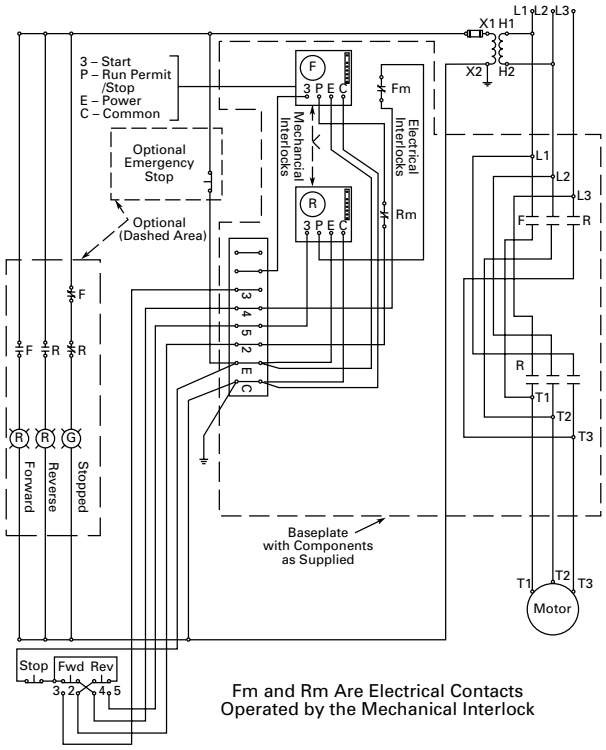
Cat. No. W201 Non-reversing Contactor
3-Wire Control with Internal Holding Circuit



Cat. No. W201 Non-reversing Contactor
2-Wire Control with Maintained HOA Switch



Cat. No. W211 Horizontal Reversing Contactor ①
3-Wire Control with Internal Holding Circuit

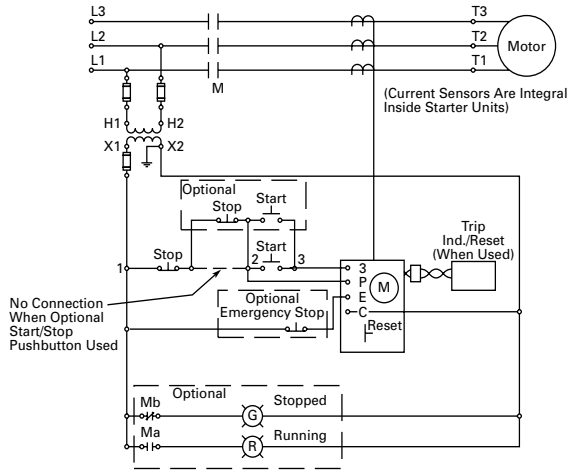


Cat. No. W251 Vertical Reversing Contactor
3-Wire Control with Internal Holding Circuit

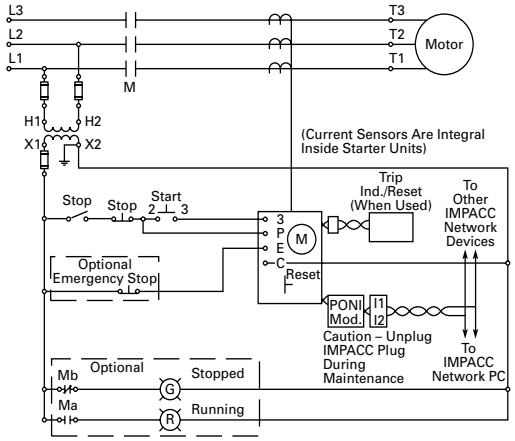
Figure 33-41. Typical Wiring Diagrams

① Sizes 5 and 6 horizontal reversing contactors have their Forward and Reverse contactor arrangement reversed. Reverse contactor is on left and Forward contactor is on right.

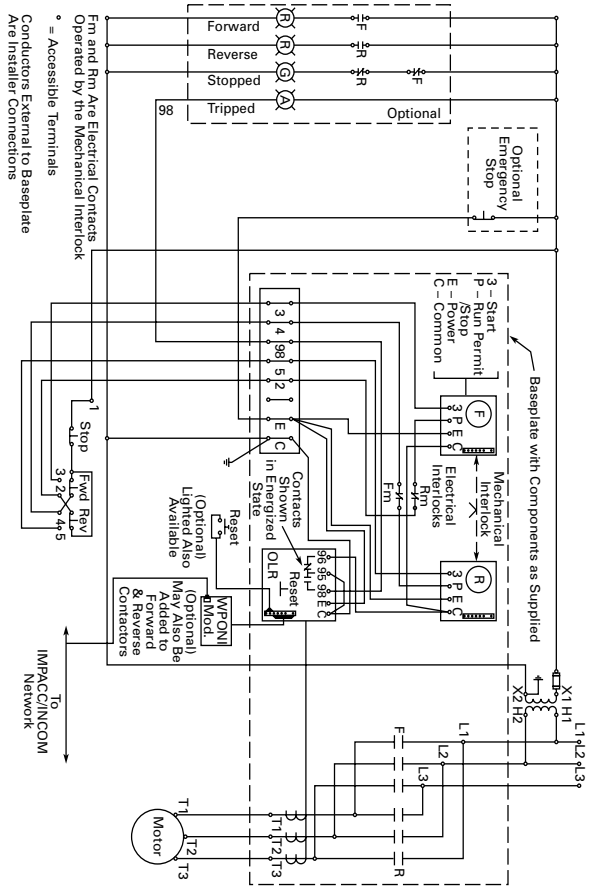
Non-reversing and Reversing Starters, NEMA Sizes 1 – 6



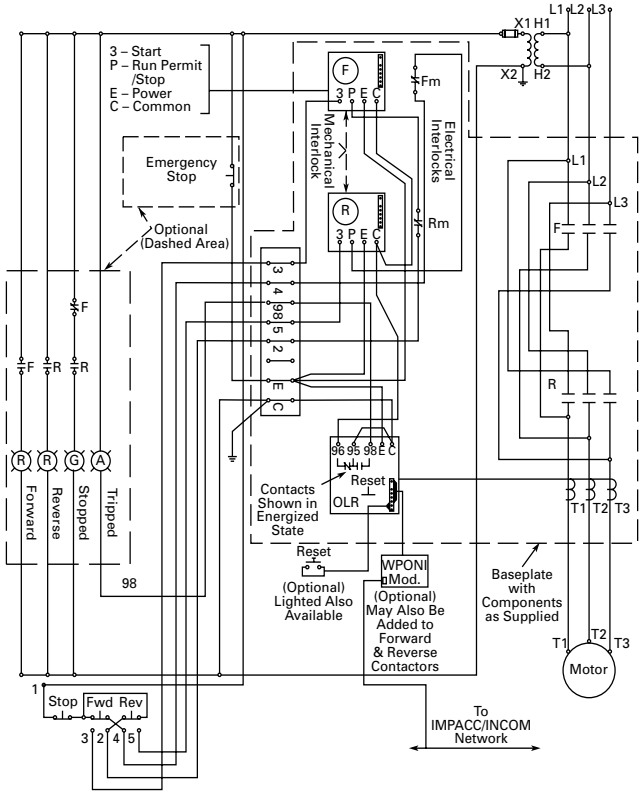
Cat. No. W200 Non-reversing Starter
3-Wire Control with Internal Holding Circuit



Cat. No. W200 Non-reversing Starter
2-Wire Control with Maintained HOA Switch



Cat. No. W210 Horizontal Reversing Starter ①
3-Wire Control with Internal Holding Circuit



Cat. No. W250 Vertical Reversing Starter
3-Wire Control with Internal Holding Circuit

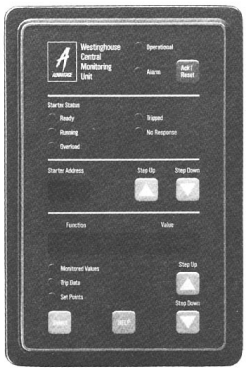
Figure 33-42. Typical Wiring Diagrams

① Sizes 5 and 6 horizontal reversing contactors have their Forward and Reverse contactor arrangement reversed. Reverse contactor is on left and Forward contactor is on right.

Contents

Description	*Page*
Central Monitoring Unit	**33-97**
Product Operated Network Interface (PONI)	**33-99**

Central Monitoring Unit



Central Monitoring Unit

Product Description

The Advantage Central Monitoring Unit is a communications center which transmits to and receives data from up to 99 Advantage starters or contactors or IQ500s equipped with PONI cards. The CMU can be mounted on the door of a motor control center or custom panel using the existing IQ cutout dimensions.

The eight-digit alphanumeric display monitors active data, trip data or set points. The group of data being displayed is indicated by one of three LEDs and is selected by the user. The two-digit alphanumeric display indicates the address of the device about which the data is being displayed. This address is also selected by the user.

Five LEDs are provided which indicate the present status of the selected starter. Two additional LEDs are also provided at the top of the panel, one which indicates that the CMU is OPERATIONAL, and another which indicates ALARM status. An ACKNOWLEDGE/RESET button permits the user to reset the CMU following a device trip.

The CMU can be interfaced into a larger PowerNet network with the addition of a PowerNet PONI Communications Module.

Parameters Displayed

- Monitored values:
  - Device description
  - 1_A, 1_B, 1_C currents
  - Control voltage (excluding IQ500)
  - Present time, date
  - Resettable operation count
  - Run time, hours
- Trip data — same as current values with cause of trip
- Set points:
  - Device size
  - OL trip current setting (FLA setting)
  - OL trip class
  - Ground fault protection — ON/OFF
  - Phase loss/unbalance protection — ON/OFF
  - Reset mode — AUTO/MANUAL
  - Frequency
  - Ground fault trip level (IQ500 only)
  - Ground fault trip delay time (IQ500 only)
  - Phase unbalance % (IQ500 only)
- IQ500M — Special Functions Module set points — if LOAD CONTROL selected:
  - Load shed level
  - Load shed delay time
  - Load resume level
  - Load resume delay time
  - Long acceleration time

  If UNDERLOAD/JAM selected:
  - Jam trip level
  - Jam trip delay time
  - Jam start delay time
  - Underload trip level
  - Underload trip delay time
  - Underload start delay time
  - Long acceleration time
  - Relay control

Technical Data

- Device power requirement: 10 VA maximum
- Frequency: 50/60 Hz
- Line characteristics: 120 or 240V AC +20%, -20% (auto selected)
- Operating temperature: 0° to 70°C (32° to 158°F)
- Storage temperature: -20° to 85°C (-4° to 185°F)
- Humidity: 0 to 95%, R.H. non-condensing
- Alarm contact ratings —
  - 240V AC: 10A, resistive
  - 30V DC: 10A, resistive

Dimensions

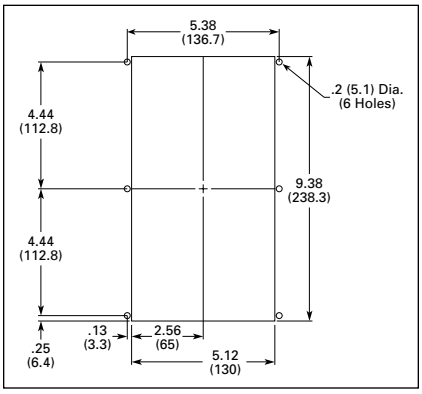


Figure 33-43. Chassis Cutout Dimensions in Inches (mm)

Wiring Diagram

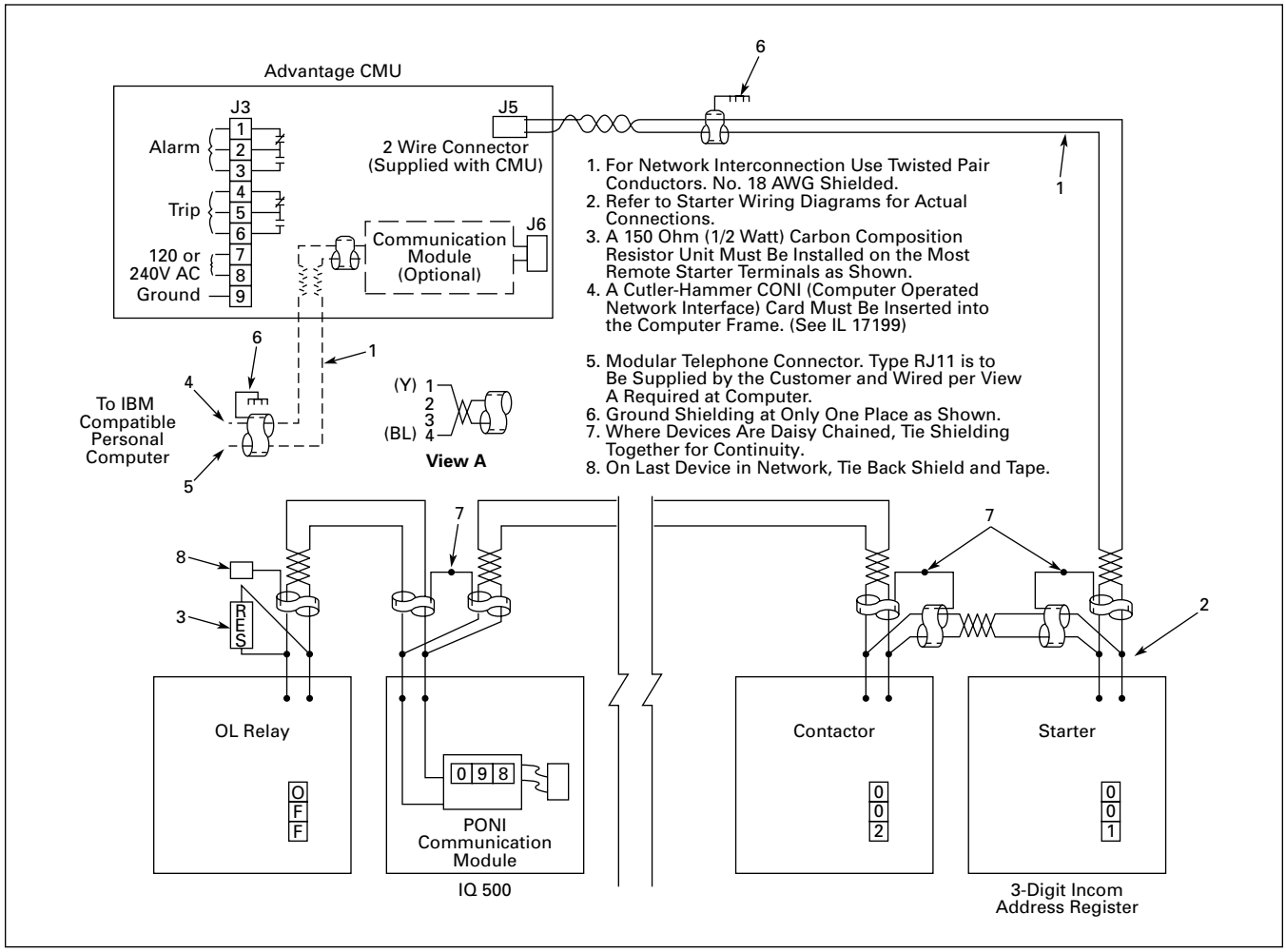


Figure 33-44. Typical Wiring Diagram

Product Selection

Table 33-161. Central Monitoring Unit

Description	Catalog Number	Price U.S. $
Advantage Central Monitoring Unit	**WCMU**	1,680.

Discount Symbol **1CD1**

Product Operated Network Interface (PONI)

Product Description

To use the PowerNet Communications network with Advantage motor control, a PONI is required for each device. The WPONI operates at 9600 baud.

Communications Data

- ON/OFF reset
- Status (ON, OFF, TRIPPED, NO RESPONSE)
- 3-phase unbalance
- % phase unbalance
- Control voltage
- Overload protection settings
- Cause of trip
- Trip data

Product Selection

Table 33-162. WPONI Network Interface

Description	Catalog Number	Price U.S. $
Advantage WPONI To panel mount a WPONI	**WPONI** **WPONIBASE**	413.00 21.40

Note: See **Page 33-84** for WPONIDNA DeviceNet Interface Module.

Mounting Dimensions

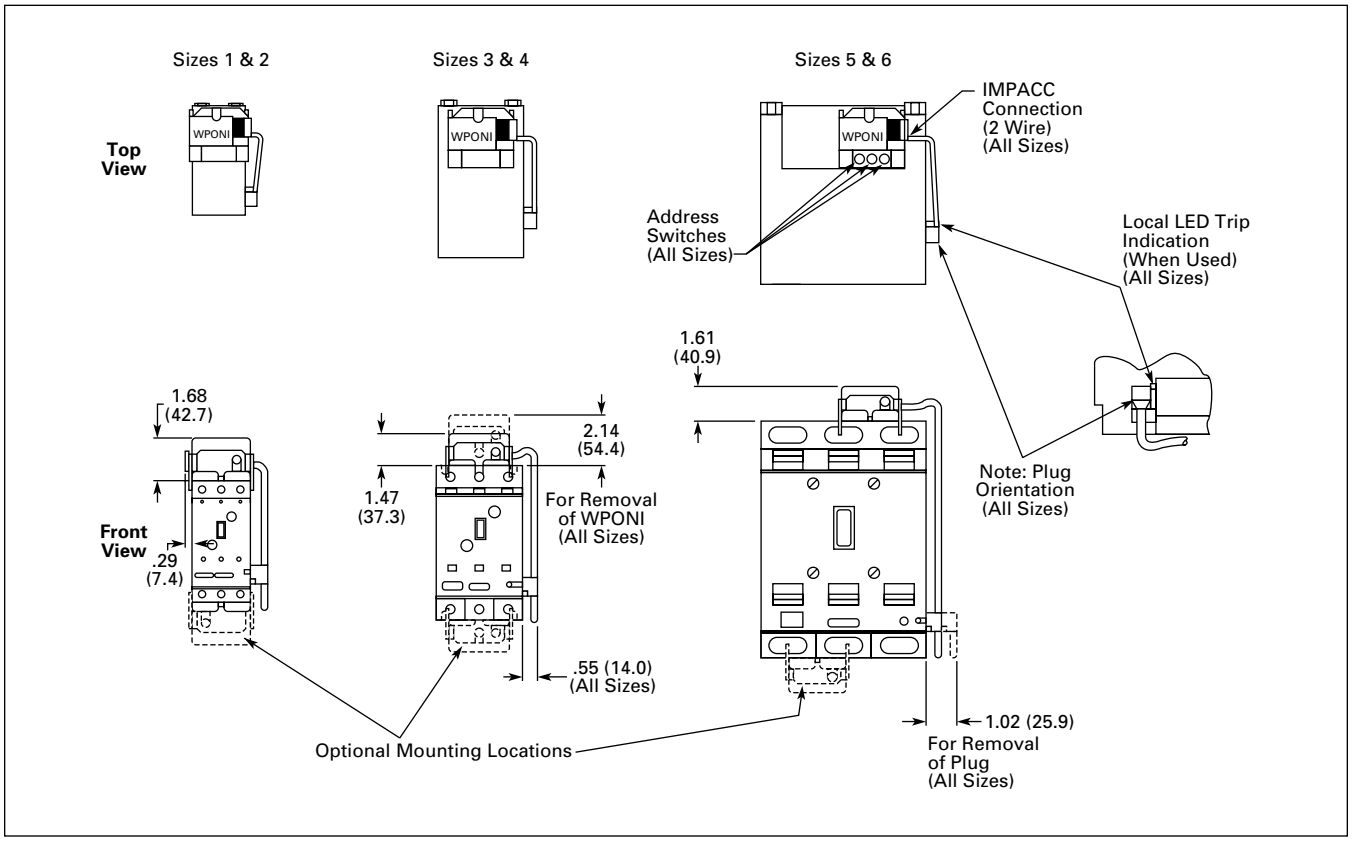


Figure 33-45. Mounting Procedures — WPONI — Approximate Dimensions in Inches (mm)

Discount Symbol **1CD1C**

Cutler-Hammer
January 2001
Vol. 2, Ref. No. [0116]

Contents

Description *Page*

3-Phase Magnetic Starters — Enclosed

Product Description **33-100**
Features, Functions, Benefits **33-100**
Modification Codes **33-100**
Cover Control **33-101**
Fuse Clips **33-102**
Catalog Number Selection **33-103**
Product Selection — Non-combination Starters **33-104**
Product Selection — Combination Starters with Disconnect Switch . . **33-107**
Product Selection — Combination Starters with HMCP or Magnetic Trip Current Breaker **33-112**

33

Catalog Number ECH2211FAD

Product Description

Setting a New Standard in Motor Control

Revolutionary in design, Advantage motor starters employ state-of-the-art technology in solving motor control application problems that have existed for ages. Customer focus group input and 66,000 man-hours of engineering ingenuity have been combined to create a motor starter that dramatically extends operating life in a physical space requirement one half the size of conventional motor starters.

Offering motor overcurrent protection accurate to 2% at maximum FLC, Advantage also maintains constant coil power regardless of varying control circuit conditions, eliminating coil burnout, contact chatter and welding due to low voltage of fluttering control signals.

Advantage is designed with a full complement of features that make it the most versatile motor starter in the industry. Multifunction overload protection options provide application flexibility while reducing inventory. Communication capability extends benefits, allowing Advantage to be interactively linked to higher order control systems for monitoring, troubleshooting and control.

Technological advances incorporated in the Advantage design, such as pre-start diagnostics, increased accuracy and the ability to communicate with other systems, are benefits not realized in traditional motor starters.

Features, Functions, Benefits

Advantage Breakthroughs

To achieve the level of benefits envisioned for Advantage controls at a competitive price, it was discovered early in the development process that simply improving existing design concepts would fall short of the mark. A new approach involving a higher level of technology was required. The result was the incorporation of three technical breakthroughs — new current sensing monitoring, an energy-balanced contact closure system that increased life by decreasing electrical and mechanical wear and an intelligent coil controller optimizing the contact closing process based on varying control circuit conditions. Coordinating these breakthroughs to provide enhanced motor control performance is concentrated in the SURE chip.

Patented SURE Chip Increases Life

Advantage uses the right combination of brains and brawn in effecting a motor start. The power circuit of the contactor employs heavy-duty silver alloy contacts scientifically designed for long life. The addition of a uniquely developed application-specific microprocessor chip, called the SURE chip, regulates power supplied to the operating coil. The regulated closing profile is tailored to existing control circuit conditions by the SURE chip. This results in an energy balanced system which reduces armature/magnet crash and contact bounce, extending mechanical and electrical life.

Improved Protection and Motor Utilization

The motor circuit monitoring and overload protection functions of Advantage starters are provided by three current sensors closely monitored by the SURE chip. This sensor/microprocessor combination yields a protection scheme closely paralleling that of the motor heating damage boundary expressed in terms of current and time. Accurate to 2%, Advantage allows full utilization of motor capability without motor damage or nuisance tripping.

No Heaters, Small Size

Advantage starters eliminate the need for costly heater elements and their associated installation expense. Standard overload protection functions include phase loss and unbalance protection, selectable trip class, automatic/manual reset and ground current protection.

Built-In Communications Capabilities Provide Two-Way Control

Advantage also offers low cost communication capability. ON-OFF commands, status and motor data can be linked to automated control systems without the addition of costly sensors, I/O modules and transducers, in a language compatible with many computer-based software systems in use today.

Protected by 22 patents and proven in many years of operating experience in harsh industrial applications, Advantage motor starters and contactors offer the user unprecedented value at a price competitive with traditional devices.

Modification Codes

See **Pages 33-41 – 33-48**.

Cover Control

Flange Mounted Pilot ACM Devices — Factory Installed — NEMA 1, 12 Only

For **Factory Installed** flange mounted pilot devices using **Advantage Control Modules** (ACMs), change the 9th character from **A** to **Y** and add one of the following (**A49** through **A62**) Mod Code Suffixes to the Catalog Number. In addition, one **A63** Mod may be added if desired.

Table 33-163. Cover Control Product Selection

Flange Mounted Pilot Devices Description	Catalog Number Field Installation Kits	Price U.S. $	Mod Code Suffix	Price U.S. $
Full Voltage				
Status Only with Reset	**WPBFV1**	153.00	**A49**	287.00
START/STOP	**WPBFV2**	225.00	**A50**	346.00
START/STOP/HOA	**WPBFV3**	277.00	**A51**	394.00
ON/OFF/AUTO	**WPBFV4**	202.00	**A52**	333.00
Reversing				
Status Only with Reset	**WPBR1**	225.00	**A53**	370.00
FWD/REV/STOP	**WPBR2**	324.00	**A54**	459.00
FWD/REV/STOP/HOA	**WPBR3**	374.00	**A55**	510.00
2-Speed				
Status Only with Reset	**WPB2S1**	225.00	**A56**	370.00
FAST/SLOW/STOP	**WPB2S2**	324.00	**A57**	459.00
FAST/SLOW/STOP/HOA	**WPB2S3**	374.00	**A58**	510.00
Reduced Voltage				
Status Only with Reset	**WPBRV1**	160.00	**A59**	328.00
START/STOP	**WPBRV2**	225.00	**A60**	387.00
START/STOP/HOA	**WPBRV3**	277.00	**A61**	434.00
ON/OFF/AUTO	**WPBRV4**	211.00	**A62**	374.00
Metering Module	**WMETER**	362.00	**A63**	369.00
10 ft. Interconnect Cable	**WACM10**	95.00	—	—
6 ft. Interconnect Cable	**WACM6**	25.75	—	—
3 ft. Interconnect Cable	**WACM3**	21.90	—	—
1 ft. Interconnect Jumper	**WACM1**	18.30	—	—

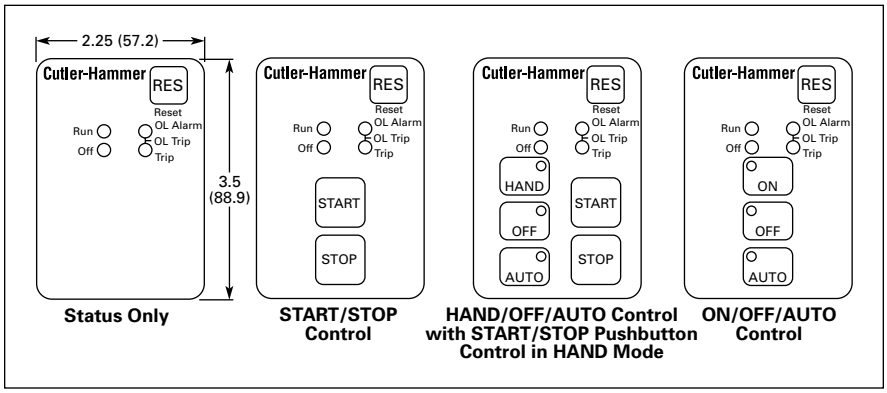


Figure 33-46. Flange Mounted Pilot ACM Devices

Other Cover Control Devices

See **Pages 33-50** – **33-51** in NEMA Contactors & Starters, Freedom Line.

Discount Symbol **1CD-1C**

Fuse Clips

C351 Fuse Clip Kit

Table 33-164. C351 — Fuse Clip Selection — 3 Poles

Starter Size	Motor Voltage	Maximum Horsepower (3-Phase)	Fuse Clip Rating		Fuse Clip Kit for Field Installation in Non-fusible Starter				Fuse Clip Kit Factory Installed	
		Dual Element Fuses	Amperes	Volts	Catalog Number For Non-rejection Type Fuses	Price U.S. $	Catalog Number For use w/ "R" Rejection Type Fuses	Price U.S. $	Position 10 Alpha ②	Price U.S. $
Non-fusible — without Fuse Clips Installed									A	N/C
0	200/230	3	30	250	**C351KC21**	12.60	**C351KC21R**	12.60	**B**	21.00
	460/575	5	30	600	**C351KD22-61**	15.70	**C351KD22-61R**	15.70	**C**	35.00
1	200/230	7-1/2	30	250	**C351KC21**	12.60	**C351KC21R**	12.60	**B**	21.00
	460/575	10	30	600	**C351KD22-61**	15.70	**C351KD22-61R**	15.70	**C**	35.00
2	200	10	60	250	**C351KD22-61**	15.70	**C351KD22-61R**	15.70	**D**	28.00
	230	15	60	250	**C351KD22-61**	15.70	**C351KD22-61R**	15.70	**D**	28.00
	460/575	25	60	600	**C351KD62**	18.80	**C351KD62R**	18.80	**E**	48.00
3	200	25	100	250	**C351KE23-63** ①	66.00	**C351KE23-63** ①	66.00	**F**	68.00
	230	30	100	250	**C351KE23-63** ①	66.00	**C351KE23-63** ①	66.00	**F**	68.00
	460/575	50	100	600	**C351KE23-63** ①	66.00	**C351KE23-63** ①	66.00	**G**	101.00
4	200	40	200	250	**C351KF24-64** ①	101.00	**C351KF24-64** ①	101.00	**H**	115.00
	230	50	200	250	**C351KF24-64** ①	101.00	**C351KF24-64** ①	101.00	**H**	115.00
	460/575	100	200	600	**C351KF24-64** ①	101.00	**C351KF24-64** ①	101.00	**J**	141.00
5	200	75	400	250	Not Available	—	Not Available	—	**K**	242.00
	230	100	400	250	in Kit Form		in Kit Form		**K**	242.00
	460/575	200	400	600					**L**	242.00

① Fuse clip "R" rejection members for use with Class R fuses are supplied loose in the Fuse Clip Kits.
② These fuse clips are for Class R fuses.

Note: Kits do not include fuses.

Discount Symbol **1CD-1C**

Catalog Number Selection

Table 33-165. Advantage Line Enclosed Control Catalog Numbering System

E C A 22 2 1 A A F -

Design
A = Advantage

Modification Codes
(See **Pages 33-41 – 33-48**)

Class	Page
01 - Contactors	①
02 - Reversing Contactors	①
05 - FVNR Starter, Non-combination	**33-104**
06 - Reversing, Non-combination	**33-105**
07 - FVNR Non-combination, with CPT	**33-106**
16 - Combination with Disconnect Switch	**33-107**
17 - Reversing, Combination with Disconnect Switch	**33-109**
18 - Combination with Disconnect Switch, with CPT	**33-111**
22 - Combination with HMCP/E	**33-112**
23 - Reversing, Combination with HMCP/E	**33-113**
24 - Combination with HMCP/E with CPT	**33-114**
33 - Multispeed 2S2W Non-combination	①
34 - Multispeed 2S1W CT or VT Non-combination	①
35 - Multispeed 2S1W CH Non-combination	①
36 - Multispeed with Disconnect Switch, 2S2W	①
37 - Multispeed with Disconnect Switch, 2S1W CT or VT	①
38 - Multispeed with Disconnect Switch, 2S1W CH	①
39 - Multispeed with HMCP/E, 2S2W	①
40 - Multispeed with HMCP/E, 2S1W CT or VT	①
41 - Multispeed with HMCP/E, 2S1W CH	①
42 - Autotransformer, Non-combination	①
43 - Autotransformer, with Disconnect Switch	①
44 - Autotransformer, with HMCP/E	①
45 - Part-Winding, Non-combination	①
46 - Part-Winding, with Disconnect Switch	①
47 - Part-Winding, with Circuit Breaker	①
48 - Y-D, Open Transition, Non-combination	①
49 - Y-D, Open Transition, with Disconnect Switch	①
50 - Y-D, Open Transition, with Circuit Breaker	①
51 - Y-D, Closed Transition, Non-combination	①
52 - Y-D, Closed Transition, with Disconnect Switch	①
53 - Y-D, Closed Transition, with Circuit Breaker	①
54 - Std Width Pump Panel, with Disconnect Switch	①
55 - Std Width Pump Panel, with HMCP/E	①
62 - Autotransformer Pump Panel, Disconnect Switch	①
63 - Autotransformer Pump Panel, HMCP/E	①
64 - Part-Winding Pump Panel, Disconnect	①
65 - Part-Winding Pump Panel, Circuit Breaker	①
68 - Duplex, Non-combination	①
69 - Duplex, with Disconnect Switch	①
70 - Duplex, with HMCP/E	①

Disconnect Fuse Clip Ratings

A - None	**G** - 100A/600V R	**N** - 600A/600V R
B - 30A/250V R	**H** - 200A/250V R	**P** - 800A/600V R
C - 30A/600V R	**J** - 200A/600V R	**Q** - 1200A/600V R
D - 60A/250V R	**K** - 400A/250V R	**R** - 1600A/600V R
E - 60A/600V R	**L** - 400A/600V R	**S** - 2000A/600V R
F - 100A/250V R	**M** - 600A/250V R	**T** - by Description

HMCP/E or Breaker Ratings

A - None	**G** - 100A	**N** - 1000A	**5** - 3A②
B - 3A	**H** - 150A	**P** - 1200A	**6** - 7A②
C - 7A	**J** - 250A	**Q** - 2000A	**7** - 15A②
D - 15A	**K** - 400A	**R** - 3000A	**8** - 30A②
E - 30A	**L** - 600A	**T** - by Description	**9** - 50A②
F - 50A	**M** - 800A		**I** - 100A②

Cover Control (Starters Only)
(**Pages 33-50 – 33-51** and **33-101**)

Number of Poles (Contactors Only)

Coil Voltage and/or Control Transformers
(See Tables Below)

Enclosure Types

1 - Type 1 – General Purpose
2 - Type 3R – Rainproof
3 - Type 4 – Watertight (Painted Steel)
4 - Type 4X – Watertight (Stainless Steel)
5 - Type 4X – Corrosion (nonmetallic) (Section 9)
6 - Type 7/9 – Bolted Hazardous Location (Section 8)
7 - Type 7/9 – Threaded Hazardous Location (Section 8)
8 - Type 12 – Dust-Tight
9 - Type 12 – Dust-Tight with Safety Door Interlock

NEMA Size

L - Lower 1
1 - Size 1
2 - Size 2
3 - Size 3
4 - Size 4
5 - Size 5
6 - Size 6

① Refer to *Enclosed Control Product Guide*, PG.3.02.T.E.
② Use with Sizes L – 3, HMCP 600V applications only.

Table 33-166. Magnet Coil Codes (System Voltage) ③

Code	Magnet Coil	Code	Magnet Coil
F	120/60	**Z**	By Description
N	110/50		

③ When control power transformer modification codes (**C1** – **C11**) are used or when starter class includes CPT (i.e. ECN07, 18), see **Table 33-167** for system voltage code.

Table 33-167. Control Power Transformer Codes (System Voltage)

Code	Primary	Secondary	Code	Primary	Secondary
B	240/480 – 220/440 Wired for 240V	120/60 – 110/50	**H**	277/60	120/60
			L	380/50	110/50
C	240/480 – 220/440 Wired for 480V	120/60 – 110/50	**M**	415/50	110/50
			X	240/480/600 Wired for 480V	120
D	600/60 – 550/50	120/60 – 110/50			
E	208/60	120/60	**Z**	By Description	

Product Selection — Non-combination Starters

- Full Voltage
- Solid-State Overload Relays
- 600V Maximum

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Table 33-168. Class ECA05 — NEMA Rated — Non-combination — Non-reversing

NEMA Size	Motor Voltage ①	Maximum hp Rating ①	Magnet Coil Voltage ③④	3-Pole NEMA 3R Rainproof		3-Pole NEMA 4X Watertight & Dust-Tight Stainless Steel		3-Pole NEMA 12 Dust-Tight Industrial External Reset (NEMA 3R) ⑤⑥	
				Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
1 ②	200 230 460 575	1 1 2 2	120	**ECA05L2FAA**	384.	**ECA05L4FAA**	555.	**ECA05L8FAA**	384.
1	200 230 460 575	7-1/2 7-1/2 10 10	120	**ECA0512FAA**	384.	**ECA0514FAA**	555.	**ECA0518FAA**	384.
2	200 230 460 575	10 15 25 25	120	**ECA0522FAA**	725.	**ECA0524FAA**	1,060.	**ECA0528FAA**	725.
3	200 230 460 575	25 30 50 50	120	**ECA0532FAA**	1,115.	**ECA0534FAA**	1,620.	**ECA0538FAA**	1,115.
4	200 230 460 575	40 50 100 100	120	**ECA0542FAA**	2,645.	**ECA0544FAA**	3,235.	**ECA0548FAA**	2,645.
5	200 230 460 575	75 100 200 200	120	**ECA0552FAA**	6,310.	**ECA0554FAA**	7,460.	**ECA0558FAA**	6,310.
6	200 230 460 575	150 200 400 400	120 ⑦	**ECA0562EAA** **ECA0562BAA** **ECA0562CAA** **ECA0562DAA**	15,370. 15,370. 15,370. 15,370.	**ECA0564EAA** **ECA0564BAA** **ECA0564CAA** **ECA0564DAA**	16,910. 16,910. 16,910. 16,910.	**ECA0568EAA** **ECA0568BAA** **ECA0568CAA** **ECA0568DAA**	15,370. 15,370. 15,370. 15,370.

① Maximum horsepower rating of starters for 380V 50 Hz applications:

NEMA Size	1 ②	1	2	3	4	5	6
Horsepower	1-1/2	10	25	50	75	150	300

② For motor full load current (FLA) range of .47A – 3.81A with a 1.15 to 1.25 service factor and for motor hp range of 1/4 hp to 2 hp at 460V.

③ All starters provided with coils for separate control.

④ Starters for 50 Hz operation use 110V 50 Hz magnet coil. Change 8th character from **F** to **N**.

⑤ Suitable for outdoor application when properly installed — see Page i-5 of PG.3.02.T.E.

⑥ Choose a NEMA 12 enclosure for NEMA 1 applications.

⑦ Size 6 includes control power transformer.

Note: Reference to *Enclosed Control Product Guide* — PG.3.02.T.E.

Description	Page
Accessories, Kits Wiring Diagrams Dimensions	11-8 to 11-15 2-66 to 2-69 12-3 to 12-24
Technical Data Multi-Speed	14-7 to 14-11 2-19 to 2-21

Cover Mounted
Control ..... **Pages 33-101, 33-50**
Modifications/
Accessories ..... **Pages 33-41 – 33-49**
Discount Symbol **1CD-1C**

Table 33-169. Class ECA06 — NEMA Rated — Non-combination — Reversing ⑨

NEMA Size	Motor Voltage ①	Maximum hp Rating ①	Magnet Coil Voltage ③④	3-Pole NEMA 3R Rainproof		3-Pole NEMA 4X ⑦ Watertight & Dust-Tight Stainless or Painted Steel		3-Pole NEMA 12 Dust-Tight Industrial External Reset (NEMA 3R) ⑤⑥	
				Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
1 ②	200 230 460 575	1 1 2 2	120	**ECA06L2FAA**	780.	**ECA06L4FAA**	1,180.	**ECA06L8FAA**	780.
1	200 230 460 575	7-1/2 7-1/2 10 10	120	**ECA0612FAA**	780.	**ECA0614FAA**	1,180.	**ECA0618FAA**	780.
2	200 230 460 575	10 15 25 25	120	**ECA0622FAA**	1,445.	**ECA0624FAA**	1,940.	**ECA0628FAA**	1,445.
3	200 230 460 575	25 30 50 50	120	**ECA0632FAA**	2,495.	**ECA0634FAA**	3,080.	**ECA0638FAA**	2,495.
4	200 230 460 575	40 50 100 100	120	**ECA0642FAA**	5,530.	**ECA0644FAA**	6,670.	**ECA0648FAA**	5,530.
5	200 230 460 575	75 100 200 200	120	**ECA0652FAA**	12,100.	**ECA0654FAA**	14,000.	**ECA0658FAA**	12,100.
6	200 230 460 575	150 200 400 400	120 ⑧	**ECA0662EAA** **ECA0662BAA** **ECA0662CAA** **ECA0662DAA**	25,420. 25,420. 25,420. 25,420.	**ECA0663EAA** **ECA0663BAA** **ECA0663CAA** **ECA0663DAA**	26,960. 26,960. 26,960. 26,960.	**ECA0668EAA** **ECA0668BAA** **ECA0668CAA** **ECA0668DAA**	25,420. 25,420. 25,420. 25,420.

① Maximum horsepower rating of starters for 380V 50 Hz applications:

NEMA Size	1 ②	1	2	3	4	5	6
Horsepower	1-1/2	10	25	50	75	150	300

② For motor full load current (FLA) range of .47A – 3.81A with a 1.15 to 1.25 service factor and for motor hp range of 1/4 hp to 2 hp at 460V.

③ All starters provided with coils for separate control.

④ Starters for 50 Hz operation use 110V 50 Hz magnet coil. Change 8th character from **F** to **N**.

⑤ Suitable for outdoor application when properly installed — see Page i-5 of PG.3.02.T.E.

⑥ Choose a NEMA 12 enclosure for NEMA 1 applications.

⑦ NEMA 4X (Stainless steel) Sizes 1 – 5, NEMA 4 (Painted steel) Size 6.

⑧ Size 6 includes control power transformer.

⑨ Reversing starters have status only ACM included as standard.

Note: Reference to *Enclosed Control Product Guide* — PG.3.02.T.E.

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Discount Symbol **1CD-1C**

Table 33-170. Class ECA07 — NEMA Rated — Non-combination with CPT — Non-reversing

NEMA Size	Primary Voltage ①⑤	Maximum hp Rating ①	Secondary Voltage / Magnet Coil Voltage	3-Pole NEMA 3R Rainproof		3-Pole NEMA 4X Watertight & Dust-Tight Stainless Steel		3-Pole NEMA 12 Dust-Tight Industrial External Reset (NEMA 3R) ③④	
				Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
1 ②	208	1	120	**ECA07L2EAA**	566.	**ECA07L4EAA**	737.	**ECA07L8EAA**	566.
	240	1		**ECA07L2BAA**	566.	**ECA07L4BAA**	737.	**ECA07L8BAA**	566.
	480	2		**ECA07L2CAA**	566.	**ECA07L4CAA**	737.	**ECA07L8CAA**	566.
	600	2		**ECA07L2DAA**	566.	**ECA07L4DAA**	737.	**ECA07L8DAA**	566.
1	208	7-1/2	120	**ECA0712EAA**	566.	**ECA0714EAA**	737.	**ECA0718EAA**	566.
	240	7-1/2		**ECA0712BAA**	566.	**ECA0714BAA**	737.	**ECA0718BAA**	566.
	480	10		**ECA0712CAA**	566.	**ECA0714CAA**	737.	**ECA0718CAA**	566.
	600	10		**ECA0712DAA**	566.	**ECA0714DAA**	737.	**ECA0718DAA**	566.
2	208	10	120	**ECA0722EAA**	980.	**ECA0724EAA**	1,315.	**ECA0728EAA**	980.
	240	15		**ECA0722BAA**	980.	**ECA0724BAA**	1,315.	**ECA0728BAA**	980.
	480	25		**ECA0722CAA**	980.	**ECA0724CAA**	1,315.	**ECA0728CAA**	980.
	600	25		**ECA0722DAA**	980.	**ECA0724DAA**	1,315.	**ECA0728DAA**	980.
3	208	25	120	**ECA0732EAA**	1,490.	**ECA0734EAA**	1,995.	**ECA0738EAA**	1,490.
	240	30		**ECA0732BAA**	1,490.	**ECA0734BAA**	1,995.	**ECA0738BAA**	1,490.
	480	50		**ECA0732CAA**	1,490.	**ECA0734CAA**	1,995.	**ECA0738CAA**	1,490.
	600	50		**ECA0732DAA**	1,490.	**ECA0734DAA**	1,995.	**ECA0738DAA**	1,490.
4	208	40	120	**ECA0742EAA**	3,100.	**ECA0744EAA**	3,690.	**ECA0748EAA**	3,100.
	240	50		**ECA0742BAA**	3,100.	**ECA0744BAA**	3,690.	**ECA0748BAA**	3,100.
	480	100		**ECA0742CAA**	3,100.	**ECA0744CAA**	3,690.	**ECA0748CAA**	3,100.
	600	100		**ECA0742DAA**	3,100.	**ECA0744DAA**	3,690.	**ECA0748DAA**	3,100.
5	208	75	120	**ECA0752EAA**	6,825.	**ECA0754EAA**	7,975.	**ECA0758EAA**	6,825.
	240	100		**ECA0752BAA**	6,825.	**ECA0754BAA**	7,975.	**ECA0758BAA**	6,825.
	480	200		**ECA0752CAA**	6,825.	**ECA0754CAA**	7,975.	**ECA0758CAA**	6,825.
	600	200		**ECA0752DAA**	6,825.	**ECA0754DAA**	7,975.	**ECA0758DAA**	6,825.
6	208	150	120	**ECA0762EAA**	16,030.	**ECA0764EAA**	17,570.	**ECA0768EAA**	16,030.
	240	200		**ECA0762BAA**	16,030.	**ECA0764BAA**	17,570.	**ECA0768BAA**	16,030.
	480	400		**ECA0762CAA**	16,030.	**ECA0764CAA**	17,570.	**ECA0768CAA**	16,030.
	600	400		**ECA0762DAA**	16,030.	**ECA0764DAA**	17,570.	**ECA0768DAA**	16,030.

① Maximum horsepower rating of starters for 380V 50 Hz applications:

NEMA Size	1 ②	1	2	3	4	5	6
Horsepower	1-1/2	10	25	50	75	150	300

② For motor full load current (FLA) range of .47A – 3.81A with a 1.15 to 1.25 service factor and for motor hp range of 1/4 hp to 2 hp at 460V.

③ Suitable for outdoor application when properly installed — see Page i-5 of PG.3.02.T.E.

④ Choose a NEMA 12 enclosure for NEMA 1 applications.

⑤ Other control power voltages, see **Page 33-103**.

Note: Reference to *Enclosed Control Product Guide* — PG.3.02.T.E.

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Discount Symbol **1CD-1C**

Product Selection — Combination Starters with Disconnect Switch

- Full Voltage
- Solid-State Overload Relays
- 600V Maximum

Table 33-171. Class ECA16 — NEMA Rated — Fusible Combination Disconnect Switch — Non-reversing

NEMA Size	Motor Voltage	Maximum hp Rating Dual Element Fuses	Magnet Coil Voltage ②③	Fuse Clip Amps. ⑧	3-Pole NEMA 1 General Purpose		3-Pole NEMA 3R Rainproof		3-Pole NEMA 4X ⑦ Watertight & Dust-Tight Stainless or Painted Steel		3-Pole NEMA 12 Dust-Tight Industrial External Reset (NEMA 3R) ④⑤⑥	
					Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
1 ①	200 230	1	120	30A	**ECA16L1FAB**	695.	**ECA16L2FAB**	855.	**ECA16L4FAB**	1,340.	**ECA16L8FAB**	855.
	460 575	2	120	30A	**ECA16L1FAC**	710.	**ECA16L2FAC**	870.	**ECA16L4FAC**	1,355.	**ECA16L8FAC**	870.
1	200 230	7-1/2	120	30A	**ECA1611FAB**	695.	**ECA1612FAB**	855.	**ECA1614FAB**	1,340.	**ECA1618FAB**	855.
	460 575	10	120	30A	**ECA1611FAC**	710.	**ECA1612FAC**	870.	**ECA1614FAC**	1,355.	**ECA1618FAC**	870.
2	200 230	10 15	120	60A	**ECA1621FAD**	1,080.	**ECA1622FAD**	1,305.	**ECA1624FAD**	2,065.	**ECA1628FAD**	1,305.
	460 575	25	120	60A	**ECA1621FAE**	1,100.	**ECA1622FAE**	1,325.	**ECA1624FAE**	2,085.	**ECA1628FAE**	1,325.
3	200 230	25 30	120	100A	**ECA1631FAF**	1,795.	**ECA1632FAF**	2,085.	**ECA1634FAF**	3,510.	**ECA1638FAF**	2,085.
	460 575	50	120	100A	**ECA1631FAG**	1,830.	**ECA1632FAG**	2,120.	**ECA1634FAG**	3,540.	**ECA1638FAG**	2,120.
4	200 230	40 50	120	200A	**ECA1641FAH**	3,410.	**ECA1642FAH**	4,220.	**ECA1644FAH**	5,610.	**ECA1648FAH**	4,220.
	460 575	100	120	200A	**ECA1641FAJ**	3,435.	**ECA1642FAJ**	4,245.	**ECA1644FAJ**	5,640.	**ECA1648FAJ**	4,245.
5	200 230	75 100	120	400A	**ECA1651FAK**	7,590.	**ECA1652FAK**	9,570.	**ECA1654FAK**	13,210.	**ECA1658FAK**	9,570.
	460 575	200	120	400A	**ECA1651FAL**	7,590.	**ECA1652FAL**	9,570.	**ECA1654FAL**	13,210.	**ECA1658FAL**	9,570.
6	200 230	150 200	120 ⑨	600A	**ECA1661EAM** **ECA1661BAM**	20,040. 20,040.	**ECA1662EAM** **ECA1662BAM**	25,370. 25,370.	**ECA1663EAM** **ECA1663BAM**	25,370. 25,370.	**ECA1668EAM** **ECA1668BAM**	25,370. 25,370.
	460 575	400		600A	**ECA1661CAN** **ECA1661DAN**	20,040. 20,040.	**ECA1662CAN** **ECA1662DAN**	22,330. 22,330.	**ECA1663CAN** **ECA1663DAN**	25,370. 25,370.	**ECA1668CAN** **ECA1668DAN**	25,370. 25,370.

① For motor full load current (FLA) range of .47A – 3.81A with a 1.15 to 1.25 service factor and for motor hp range of 1/4 hp to 2 hp at 460V.
② All starters provided with coils for separate control.
③ Starters for 50 Hz operation use 110V 50 Hz magnet coil. Change 8th character from **F** to **N**.
④ Suitable for outdoor application when properly installed — see Page i-5 of PG.3.02.T.E.
⑤ All NEMA 12 enclosures are standardized with external reset. For internal reset, order mod code **R5**.
⑥ NEMA 12 enclosure is without safety door interlock. When safety door interlock is required, change seventh character from **8** to **9**, i.e. ECA161**8**FAC would become ECA161**9**FAC.
⑦ NEMA 4X (Stainless steel) Sizes 1 – 5, NEMA 4 (Painted steel) Size 6.
⑧ Fuse clips are for Class R fuses only. For H and J fuses see mods, **Page 33-44**.
⑨ Size 6 includes control power transformer.

Note: Reference to *Enclosed Control Product Guide* — PG.3.02.T.E.

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ECA1611FAA

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Discount Symbol **1CD-1C**

Table 33-172. Class ECA16 — NEMA Rated — Non-fusible Combination Disconnect Switch — Non-reversing

NEMA Size	Motor Voltage	Max. hp Rating	Magnet Coil Voltage ②③	Disconnect Amperes	3-Pole NEMA 1 General Purpose		3-Pole NEMA 3R Rainproof		3-Pole NEMA 4X ⑦ Watertight & Dust-Tight Stainless or Painted Steel		3-Pole NEMA 12 Dust-Tight Industrial External Reset (NEMA 3R) ④⑤⑥	
					Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
1 ①	200 230 460 575	1 1 2 2	120	30A	**ECA16L1FAA**	675.	**ECA16L2FAA**	835.	**ECA16L4FAA**	1,315.	**ECA16L8FAA**	835.
1	200 230 460 575	7-1/2 7-1/2 10 10	120	30A	**ECA1611FAA**	675.	**ECA1612FAA**	835.	**ECA1614FAA**	1,315.	**ECA1618FAA**	835.
2	200 230 460 575	10 15 25 25	120	60A	**ECA1621FAA**	1,050.	**ECA1622FAA**	1,280.	**ECA1624FAA**	2,040.	**ECA1628FAA**	1,280.
3	200 230 460 575	25 30 50 50	120	100A	**ECA1631FAA**	1,725.	**ECA1632FAA**	2,020.	**ECA1634FAA**	3,450.	**ECA1638FAA**	2,020.
4	200 230 460 575	40 50 100 100	120	200A	**ECA1641FAA**	3,295.	**ECA1642FAA**	4,110.	**ECA1644FAA**	5,500.	**ECA1648FAA**	4,110.
5	200 230 460 575	75 100 200 200	120	400A	**ECA1651FAA**	7,350.	**ECA1652FAA**	9,330.	**ECA1654FAA**	12,970.	**ECA1658FAA**	9,330.
6	200 230 460 575	150 200 400 400	120 ⑧	600A	**ECA1661EAA** **ECA1661BAA** **ECA1661CAA** **ECA1661DAA**	19,330. 19,330. 19,330. 19,330.	**ECA1662EAA** **ECA1662BAA** **ECA1662CAA** **ECA1662DAA**	21,630. 21,630. 21,630. 21,630.	**ECA1663EAA** **ECA1663BAA** **ECA1663CAA** **ECA1663DAA**	24,670. 24,670. 24,670. 24,670.	**ECA1668EAA** **ECA1668BAA** **ECA1668CAA** **ECA1668DAA**	21,630. 21,630. 21,630. 21,630.

① For motor full load current (FLA) range of .47A – 3.81A with a 1.15 to 1.25 service factor and for motor hp range of 1/4 hp to 2 hp at 460V.

② All starters provided with coils for separate control.

③ Starters for 50 Hz operation use 110V 50 Hz magnet coil. Change 8th character from **F** to **N**.

④ Suitable for outdoor application when properly installed — see Page i-5 of PG.3.02.T.E.

⑤ All NEMA 12 enclosures are standardized with external reset. For internal reset, order mod code **R5**.

⑥ NEMA 12 enclosure is without safety door interlock. When safety door interlock is required, change seventh character from 8 to 9, i.e. ECA161**8**FAA would become ECA161**9**FAA.

⑦ NEMA 4X (Stainless steel) Sizes 1 – 5, NEMA 4 (Painted steel) Size 6.

⑧ Size 6 includes control power transformer.

Note: Reference to *Enclosed Control Product Guide* — PG.3.02.T.E.

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Discount Symbol **1CD-1C**

Table 33-173. Class ECA17 — NEMA Rated — Fusible Combination Disconnect Switch — Reversing ⑩

NEMA Size	Motor Voltage	Max. hp Rating Dual Element Fuses	Magnet Coil Voltage ②③	Fuse Clip Amperes ⑧	3-Pole NEMA 1 General Purpose		3-Pole NEMA 3R Rainproof		3-Pole NEMA 4X ⑦ Watertight & Dust-Tight Stainless or Painted Steel		3-Pole NEMA 12 Dust-Tight Industrial External Reset (NEMA 3R) ④⑤⑥	
					Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
1 ①	200 230	1	120	30A	**ECA17L1FAB**	1,120.	**ECA17L2FAB**	1,345.	**ECA17L4FAB**	1,935.	**ECA17L8FAB**	1,345.
	460 575	2	120	30A	**ECA17L1FAC**	1,130.	**ECA17L2FAC**	1,360.	**ECA17L4FAC**	1,945.	**ECA17L8FAC**	1,360.
1	200 230	7-1/2	120	30A	**ECA1711FAB**	1,120.	**ECA1712FAB**	1,345.	**ECA1714FAB**	1,935.	**ECA1718FAB**	1,345.
	460 575	10	120	30A	**ECA1711FAC**	1,130.	**ECA1712FAC**	1,360.	**ECA1714FAC**	1,945.	**ECA1718FAC**	1,360.
2	200 230	10 15	120	60A	**ECA1721FAD**	1,840.	**ECA1722FAD**	2,130.	**ECA1724FAD**	3,080.	**ECA1728FAD**	2,130.
	460 575	25	120	60A	**ECA1721FAE**	1,860.	**ECA1722FAE**	2,155.	**ECA1724FAE**	3,100.	**ECA1728FAE**	2,155.
3	200 230	25 30	120	100A	**ECA1731FAF**	3,050.	**ECA1732FAF**	3,435.	**ECA1734FAF**	5,230.	**ECA1738FAF**	3,435.
	460 575	50	120	100A	**ECA1731FAG**	3,080.	**ECA1732FAG**	3,465.	**ECA1734FAG**	5,260.	**ECA1738FAG**	3,465.
4	200 230	40 50	120	200A	**ECA1741FAH**	6,320.	**ECA1742FAH**	7,380.	**ECA1744FAH**	9,070.	**ECA1748FAH**	7,380.
	460 575	100	120	200A	**ECA1741FAJ**	6,350.	**ECA1742FAJ**	7,410.	**ECA1744FAJ**	9,100.	**ECA1748FAJ**	7,410.
5	200 230	75 100	120	400A	**ECA1751FAK**	12,310.	**ECA1752FAK**	14,840.	**ECA1754FAK**	19,340.	**ECA1758FAK**	14,840.
	460 575	200	120	400A	**ECA1751FAL**	12,310.	**ECA1752FAL**	14,840.	**ECA1754FAL**	19,340.	**ECA1758FAL**	14,840.
6	200 230	150 200	120 ⑨	600A	**ECA1761EAM** **ECA1761BAM**	30,080. 30,080.	**ECA1762EAM** **ECA1762BAM**	31,880. 31,880.	**ECA1763EAM** **ECA1763BAM**	33,430. 33,430.	**ECA1768EAM** **ECA1768BAM**	31,880. 31,880.
	460 575	400	120 ⑨	600A	**ECA1761CAN** **ECA1761DAN**	30,080. 30,080.	**ECA1762CAN** **ECA1762DAN**	31,880. 31,880.	**ECA1763CAN** **ECA1763DAN**	33,430. 33,430.	**ECA1768CAN** **ECA1768DAN**	31,880. 31,880.

① For motor full load current (FLA) range of .47A – 3.81A with a 1.15 to 1.25 service factor and for motor hp range of 1/4 hp to 2 hp at 460V.

② All starters provided with coils for separate control.

③ Starters for 50 Hz operation use 110V 50 Hz magnet coil. Change 8th character from **F** to **N**.

④ Suitable for outdoor application when properly installed — see Page i-5 of PG.3.02.T.E.

⑤ All NEMA 12 enclosures are standardized with external reset. For internal reset, order mod code **R5**.

⑥ NEMA 12 enclosure is without safety door interlock. When safety door interlock is required, change seventh character from **8** to **9**, i.e. ECA171**8**FAC would become ECA171**9**FAC.

⑦ NEMA 4X (Stainless steel) Sizes 1 – 5, NEMA 4 (Painted steel) Size 6.

⑧ Fuse clips are for Class R fuses only. For H and J fuses see mods, **Page 33-44**.

⑨ Size 6 includes control power transformer.

⑩ Reversing starters have status only ACM included as standard.

Note: Reference to *Enclosed Control Product Guide* — PG.3.02.T.E.

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Discount Symbol **1CD-1C**

Table 33-174. Class ECA17 — NEMA Rated — Non-fusible Combination Disconnect Switch — Reversing ⑨

NEMA Size	Motor Voltage	Max. hp Rating	Magnet Coil Voltage ②③	Disconnect Amperes	3-Pole NEMA 1 General Purpose		3-Pole NEMA 3R Rainproof		3-Pole NEMA 4X ⑦ Watertight & Dust-Tight Stainless or Painted Steel		3-Pole NEMA 12 Dust-Tight Industrial External Reset (NEMA 3R) ④⑤⑥	
					Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
1 ①	200 230 460 575	1 1 2 2	120	30A	**ECA17L1FAA**	1,100.	**ECA17L2FAA**	1,325.	**ECA17L4FAA**	1,910.	**ECA17L8FAA**	1,325.
1	200 230 460 575	7-1/2 7-1/2 10 10	120	30A	**ECA1711FAA**	1,100.	**ECA1712FAA**	1,325.	**ECA1714FAA**	1,910.	**ECA1718FAA**	1,325.
2	200 230 460 575	10 15 25 25	120	60A	**ECA1721FAA**	1,815.	**ECA1722FAA**	2,105.	**ECA1724FAA**	3,055.	**ECA1728FAA**	2,105.
3	200 230 460 575	25 30 50 50	120	100A	**ECA1731FAA**	2,980.	**ECA1732FAA**	3,365.	**ECA1734FAA**	5,150.	**ECA1738FAA**	3,365.
4	200 230 460 575	40 50 100 100	120	200A	**ECA1741FAA**	6,210.	**ECA1742FAA**	7,270.	**ECA1744FAA**	8,960.	**ECA1748FAA**	7,270.
5	200 230 460 575	75 100 200 200	120	400A	**ECA1751FAA**	12,070.	**ECA1752FAA**	14,600.	**ECA1754FAA**	19,090.	**ECA1758FAA**	14,600.
6	200 230 460 575	150 200 400 400	120 ⑧	600A	**ECA1761EAA** **ECA1761BAA** **ECA1761CAA** **ECA1761DAA**	29,380. 29,380. 29,380. 29,380.	**ECA1762EAA** **ECA1762BAA** **ECA1762CAA** **ECA1762DAA**	31,180. 31,180. 31,180. 31,180.	**ECA1763EAA** **ECA1763BAA** **ECA1763CAA** **ECA1763DAA**	32,720. 32,720. 32,720. 32,720.	**ECA1768EAA** **ECA1768BAA** **ECA1768CAA** **ECA1768DAA**	31,180. 31,180. 31,180. 31,180.

① For motor full load current (FLA) range of .47A – 3.81A with a 1.15 to 1.25 service factor and for motor hp range of 1/4 hp to 2 hp at 460V.

② All starters provided with coils for separate control.

③ Starters for 50 Hz operation use 110V 50 Hz magnet coil. Change 8th character from **F** to **N**.

④ Suitable for outdoor application when properly installed — see Page i-5 of PG.3.02.T.E.

⑤ All NEMA 12 enclosures are standardized with external reset. For internal reset, order mod code **R5**.

⑥ NEMA 12 enclosure is without safety door interlock. When safety door interlock is required, change seventh character from **8** to **9**, i.e. ECA171**8**FAA would become ECA171**9**FAA.

⑦ NEMA 4X (Stainless steel) Sizes 1 – 5, NEMA 4 (Painted steel) Size 6.

⑧ Size 6 includes control power transformer.

⑨ Reversing starters have status only ACM included as standard.

Note: Reference to *Enclosed Control Product Guide* — PG.3.02.T.E.

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Discount Symbol **1CD-1C**

Table 33-175. Class ECA18 — NEMA Rated — Fusible and Non-fusible Combination Disconnect Switch with CPT— Non-reversing

NEMA Size	Primary Voltage ②	Max. hp Rating Dual Element Fuses	Secondary Voltage / Magnet Coil Voltage	Fuse Clip Amps. ⑦	3-Pole NEMA 1 General Purpose		3-Pole NEMA 3R Rainproof		3-Pole NEMA 4X ⑥ Watertight & Dust-Tight Stainless or Painted Steel		3-Pole NEMA 12 Dust-Tight Industrial External Reset (NEMA 3R)③④⑤	
					Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
Fusible												
1 ①	208 240	1	120	30A	**ECA18L1EAB** **ECA18L1BAB**	877.	**ECA18L2EAB** **ECA18L2BAB**	1,037.	**ECA18L4EAB** **ECA18L4BAB**	1,522.	**ECA18L8EAB** **ECA18L8BAB**	1,037.
	480 600	2	120	30A	**ECA18L1CAC** **ECA18L1DAC**	892.	**ECA18L2CAC** **ECA18L2DAC**	1,052.	**ECA18L4CAC** **ECA18L4DAC**	1,537.	**ECA18L8CAC** **ECA18L8DAC**	1,052.
1	208 240	7-1/2	120	30A	**ECA1811EAB** **ECA1811BAB**	877.	**ECA1812EAB** **ECA1812BAB**	1,037.	**ECA1814EAB** **ECA1814BAB**	1,522.	**ECA1818EAB** **ECA1818BAB**	1,037.
	480 600	10	120	30A	**ECA1811CAC** **ECA1811DAC**	892.	**ECA1812CAC** **ECA1812DAC**	1,052.	**ECA1814CAC** **ECA1814DAC**	1,537.	**ECA1818CAC** **ECA1818DAC**	1,052.
2	208 240	10 15	120	60A	**ECA1821EAD** **ECA1821BAD**	1,335.	**ECA1822EAD** **ECA1822BAD**	1,560.	**ECA1824EAD** **ECA1824BAD**	2,320.	**ECA1828EAD** **ECA1828BAD**	1,560.
	480 600	25	120	60A	**ECA1821CAE** **ECA1821DAE**	1,335.	**ECA1822CAE** **ECA1822DAE**	1,580.	**ECA1824CAE** **ECA1824DAE**	2,340.	**ECA1828CAE** **ECA1828DAE**	1,580.
3	208 240	25 30	120	100A	**ECA1831EAF** **ECA1831BAF**	2,170.	**ECA1832EAF** **ECA1832BAF**	2,460.	**ECA1834EAF** **ECA1834BAF**	3,885.	**ECA1838EAF** **ECA1838BAF**	2,460.
	480 600	50	120	100A	**ECA1831CAG** **ECA1831DAG**	2,205.	**ECA1832CAG** **ECA1832DAG**	2,495.	**ECA1834CAG** **ECA1834DAG**	3,915.	**ECA1838CAG** **ECA1838DAG**	2,495.
4	208 240	40 50	120	200A	**ECA1841EAH** **ECA1841BAH**	3,865.	**ECA1842EAH** **ECA1842BAH**	4,675.	**ECA1844EAH** **ECA1844BAH**	6,065.	**ECA1848EAH** **ECA1848BAH**	4,675.
	480 600	100	120	200A	**ECA1841CAJ** **ECA1841DAJ**	3,890.	**ECA1842CAJ** **ECA1842DAJ**	4,700.	**ECA1844CAJ** **ECA1844DAJ**	6,095.	**ECA1848CAJ** **ECA1848DAJ**	4,700.
Non-fusible												
1 ①	208 240 480 600	1 1 2 2	120	30A	**ECA18L1EAA** **ECA18L1BAA** **ECA18L1CAA** **ECA18L1DAA**	857. 857. 857. 857.	**ECA18L2EAA** **ECA18L2BAA** **ECA18L2CAA** **ECA18L2DAA**	1,017. 1,017. 1,017. 1,017.	**ECA18L4EAA** **ECA18L4BAA** **ECA18L4CAA** **ECA18L4DAA**	1,497. 1,497. 1,497. 1,497.	**ECA18L8EAA** **ECA18L8BAA** **ECA18L8CAA** **ECA18L8DAA**	1,017. 1,017. 1,017. 1,017.
1	208 240 480 600	7-1/2 7-1/2 10 10	120	30A	**ECA1811EAA** **ECA1811BAA** **ECA1811CAA** **ECA1811DAA**	857. 857. 857. 857.	**ECA1812EAA** **ECA1812BAA** **ECA1812CAA** **ECA1812DAA**	1,017. 1,017. 1,017. 1,017.	**ECA1814EAA** **ECA1814BAA** **ECA1814CAA** **ECA1814DAA**	1,497. 1,497. 1,497. 1,497.	**ECA1818EAA** **ECA1818BAA** **ECA1818CAA** **ECA1818DAA**	1,017. 1,017. 1,017. 1,017.
2	208 240 480 600	10 15 25 25	120	60A	**ECA1821EAA** **ECA1821BAA** **ECA1821CAA** **ECA1821DAA**	1,305. 1,305. 1,305. 1,305.	**ECA1822EAA** **ECA1822BAA** **ECA1822CAA** **ECA1822DAA**	1,535. 1,535. 1,535. 1,535.	**ECA1824EAA** **ECA1824BAA** **ECA1824CAA** **ECA1824DAA**	2,295. 2,295. 2,295. 2,295.	**ECA1828EAA** **ECA1828BAA** **ECA1828CAA** **ECA1828DAA**	1,535. 1,535. 1,535. 1,535.
3	208 240 480 600	25 30 50 50	120	100A	**ECA1831EAA** **ECA1831BAA** **ECA1831CAA** **ECA1831DAA**	2,100. 2,100. 2,100. 2,100.	**ECA1832EAA** **ECA1832BAA** **ECA1832CAA** **ECA1832DAA**	2,395. 2,395. 2,395. 2,395.	**ECA1834EAA** **ECA1834BAA** **ECA1834CAA** **ECA1834DAA**	3,825. 3,825. 3,825. 3,825.	**ECA1838EAA** **ECA1838BAA** **ECA1838CAA** **ECA1838DAA**	2,395. 2,395. 2,395. 2,395.
4	208 240 480 600	40 50 100 100	120	200A	**ECA1841EAA** **ECA1841BAA** **ECA1841CAA** **ECA1841DAA**	3,750. 3,750. 3,750. 3,750.	**ECA1842EAA** **ECA1842BAA** **ECA1842CAA** **ECA1842DAA**	4,565. 4,565. 4,565. 4,565.	**ECA1844EAA** **ECA1844BAA** **ECA1844CAA** **ECA1844DAA**	5,955. 5,955. 5,955. 5,955.	**ECA1848EAA** **ECA1848BAA** **ECA1848CAA** **ECA1848DAA**	4,565. 4,565. 4,565. 4,565.

① For motor full load current (FLA) range of .47A – 3.81A with a 1.15 to 1.25 service factor and for motor hp range of 1/4 hp to 2 hp at 460V.

② Other control power transformer primary and/or secondary voltages, see **Page 33-103**.

③ Suitable for outdoor application when properly installed — see Page i-5 of PG.3.02.T.E.

④ All NEMA 12 enclosures are standardized with external reset. For internal reset, order mod code **R5**.

⑤ NEMA 12 enclosure is without safety door interlock. When safety door interlock is required, change seventh character from **8** to **9**, i.e. ECA181**8**EAA would become ECA181**9**EAA.

⑥ NEMA 4X (Stainless steel) Sizes 1 – 5, NEMA 4 (Painted steel) Size 6.

⑦ Fuse clips are for Class R fuses only. For H and J Fuses see mods, **Page 33-44**.

Note: Reference to *Enclosed Control Product Guide* — PG.3.02.T.E.

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Discount Symbol **1CD-1C**

Product Selection — Combination Starters with HMCP/E or Magnetic Trip Circuit Breaker

- Full Voltage
- Solid-State Overload Relays
- 600V Maximum

Table 33-176. Class ECA22 — NEMA Rated — Combination HMCP or Magnetic Trip Circuit Breaker — Non-reversing

NEMA Size	Motor Voltage	Max. hp Rating	Magnet Coil Voltage ②③	Circuit Breaker Type	3-Pole NEMA 1 General Purpose		3-Pole NEMA 3R Rainproof		3-Pole NEMA 4X ⑦ Watertight & Dust-Tight Stainless or Painted Steel		3-Pole NEMA 12 Dust-Tight Industrial External Reset (NEMA 3R) ④⑤⑥	
					Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
1 ①	200 230 460	1 1 3/4 2	120	HMCPE 7A HMCPE 7A HMCPE 3A HMCPE 7A	**ECA22L1FAC** **ECA22L1FAC** **ECA22L1FAB** **ECA22L1FAC**	920.	**ECA22L2FAC** **ECA22L2FAC** **ECA22L2FAB** **ECA22L2FAC**	1,080.	**ECA22L4FAC** **ECA22L4FAC** **ECA22L4FAB** **ECA22L4FAC**	1,555.	**ECA22L8FAC** **ECA22L8FAC** **ECA22L8FAB** **ECA22L8FAC**	1,080.
	575	1 2	120	HMCP 3A HMCP 7A	**ECA22L1FA5** **ECA22L1FA6**	920.	**ECA22L2FA5** **ECA22L2FA6**	1,080.	**ECA22L4FA5** **ECA22L4FA6**	1,555.	**ECA22L8FA5** **ECA22L8FA6**	1,080.
1	200	1 2 7-1/2	120	HMCPE 7A HMCPE 15A HMCPE 30A	**ECA2211FAC** **ECA2211FAD** **ECA2211FAE**	920.	**ECA2212FAC** **ECA2212FAD** **ECA2212FAE**	1,080.	**ECA2214FAC** **ECA2214FAD** **ECA2214FAE**	1,555.	**ECA2218FAC** **ECA2218FAD** **ECA2218FAE**	1,080.
	230	1 2 7-1/2	120	HMCPE 7A HMCPE 15A HMCPE 30A	**ECA2211FAC** **ECA2211FAD** **ECA2211FAE**	920.	**ECA2212FAC** **ECA2212FAD** **ECA2212FAE**	1,080.	**ECA2214FAC** **ECA2214FAD** **ECA2214FAE**	1,555.	**ECA2218FAC** **ECA2218FAD** **ECA2218FAE**	1,080.
	460	3/4 2 5 10	120	HMCPE 3A HMCPE 7A HMCPE 15A HMCPE 30A	**ECA2211FAB** **ECA2211FAC** **ECA2211FAD** **ECA2211FAE**	920.	**ECA2212FAB** **ECA2212FAC** **ECA2212FAD** **ECA2212FAE**	1,080.	**ECA2214FAB** **ECA2214FAC** **ECA2214FAD** **ECA2214FAE**	1,555.	**ECA2218FAB** **ECA2218FAC** **ECA2218FAD** **ECA2218FAE**	1,080.
	575	1 3 7-1/2 10	120	HMCP 3A HMCP 7A HMCP 15A HMCP 30A	**ECA2211FA5** **ECA2211FA6** **ECA2211FA7** **ECA2211FA8**	920.	**ECA2212FA5** **ECA2212FA6** **ECA2212FA7** **ECA2212FA8**	1,080.	**ECA2214FA5** **ECA2214FA6** **ECA2214FA7** **ECA2214FA8**	1,555.	**ECA2218FA5** **ECA2218FA6** **ECA2218FA7** **ECA2218FA8**	1,080.
2	200 230 460	10 15 25	120	HMCPE 50A	**ECA2221FAF**	1,285.	**ECA2222FAF**	1,515.	**ECA2224FAF**	2,270.	**ECA2228FAF**	1,515.
	575	25	120	HMCP 50A	**ECA2221FA9**	1,285.	**ECA2222FA9**	1,515.	**ECA2224FA9**	2,270.	**ECA2228FA9**	1,515.
3	200 230 460	25 30 50	120	HMCPE 100A	**ECA2231FAG**	1,855.	**ECA2232FAG**	2,150.	**ECA2234FAG**	3,575.	**ECA2238FAG**	2,150.
	575	50	120	HMCP 100A	**ECA2231FAI**	1,855.	**ECA2232FAI**	2,150.	**ECA2234FAI**	3,575.	**ECA2238FAI**	2,150.
4	200 230 460 575	40 50 100 100	120	HMCP 150A	**ECA2241FAH**	4,020.	**ECA2242FAH**	4,835.	**ECA2244FAH**	6,230.	**ECA2248FAH**	4,835.
5	200 230 460 575	60 75 150 200	120	HMCP 250A	**ECA2251FAJ**	9,290.	**ECA2252FAJ**	10,750.	**ECA2254FAJ**	14,900.	**ECA2258FAJ**	10,750.
	200 230 460	75 100 200	120	HMCP 400A	**ECA2251FAK**	9,290.	**ECA2252FAK**	10,750.	**ECA2254FAK**	14,900.	**ECA2258FAK**	10,750.
6	200 230 460 575	150 150 300 300	120 ⑧	HMCP 600A	**ECA2261EAL** **ECA2261BAL** **ECA2261CAL** **ECA2261DAL**	19,930. 19,930. 19,930. 19,930.	**ECA2262EAL** **ECA2262BAL** **ECA2262CAL** **ECA2262DAL**	21,910. 21,910. 21,910. 21,910.	**ECA2263EAL** **ECA2263BAL** **ECA2263CAL** **ECA2263DAL**	23,440. 23,440. 23,440. 23,440.	**ECA2268EAL** **ECA2268BAL** **ECA2268CAL** **ECA2268DAL**	21,910. 21,910. 21,910. 21,910.
	230 60 575	200 400 400	120 ⑧	MD 800A	**ECA2261BAM** **ECA2261CAM** **ECA2261DAM**	19,930. 19,930. 19,930.	**ECA2262BAM** **ECA2262CAM** **ECA2262DAM**	21,910. 21,910. 21,910.	**ECA2263BAM** **ECA2263CAM** **ECA2263DAM**	23,440. 23,440. 23,440.	**ECA2268BAM** **ECA2268CAM** **ECA2268DAM**	21,910. 21,910. 21,910.

① For motor full load current (FLA) range of .47A – 3.81A with a 1.15 to 1.25 service factor and for motor hp range of 1/4 hp to 2 hp at 460V.

② All starters provided with coils for separate control.

③ Starters for 50 Hz operation use 110V 50 Hz magnet coil. Change 8th character from **F** to **N**.

④ Suitable for outdoor application when properly installed — see Page i-5 of PG.3.02.T.E.

⑤ All NEMA 12 enclosures are standardized with external reset. For internal reset, order mod code **R5**.

⑥ NEMA 12 enclosure is without safety door interlock. When safety door interlock is required, change seventh character from **8** to **9**, i.e. ECA221**8**FAC would become ECA221**9**FAC.

⑦ NEMA 4X (Stainless steel) Sizes 1 – 5, NEMA 4 (Painted steel) Size 6.

⑧ Size 6 includes control power transformer.

Note: Reference to *Enclosed Control Product Guide* — PG.3.02.T.E.

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Discount Symbol **1CD-1C**

Table 33-177. Class ECA23 — NEMA Rated — Combination HMCP or Magnetic Trip Circuit Breaker — Reversing ⑨

NEMA Size	Motor Voltage	Max. hp Rating	Magnet Coil Voltage ②③	Circuit Breaker Type	3-Pole NEMA 1 General Purpose		3-Pole NEMA 3R Rainproof		3-Pole NEMA 4X ⑦ Watertight & Dust-Tight Stainless or Painted Steel		3-Pole NEMA 12 Dust-Tight Industrial External Reset (NEMA 3R) ④⑤⑥	
					Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
1①	200	1	120	HMCPE 7A	**ECA23L1FAC**	1,310.	**ECA23L2FAC**	1,540.	**ECA23L4FAC**	2,125.	**ECA23L8FAC**	1,540.
	230	1		HMCPE 7A	**ECA23L1FAC**	1,310.	**ECA23L2FAC**	1,540.	**ECA23L4FAC**	2,125.	**ECA23L8FAC**	1,540.
	460	3/4		HMCPE 3A	**ECA23L1FAB**	1,310.	**ECA23L2FAB**	1,540.	**ECA23L4FAB**	2,125.	**ECA23L8FAB**	1,540.
		2		HMCPE 7A	**ECA23L1FAC**	1,310.	**ECA23L2FAC**	1,540.	**ECA23L4FAC**	2,125.	**ECA23L8FAC**	1,540.
	575	1	120	HMCP 3A	**ECA23L1FA5**	1,310.	**ECA23L2FA5**	1,540.	**ECA23L4FA5**	2,125.	**ECA23L8FA5**	1,540.
		2		HMCP 7A	**ECA23L1FA6**	1,310.	**ECA23L2FA6**	1,540.	**ECA23L4FA6**	2,125.	**ECA23L8FA6**	1,540.
1	200	1	120	HMCPE 7A	**ECA2311FAC**	1,310.	**ECA2312FAC**	1,540.	**ECA2314FAC**	2,125.	**ECA2318FAC**	1,540.
		2		HMCPE 15A	**ECA2311FAD**	1,310.	**ECA2312FAD**	1,540.	**ECA2314FAD**	2,125.	**ECA2318FAD**	1,540.
		7-1/2		HMCPE 30A	**ECA2311FAE**	1,310.	**ECA2312FAE**	1,540.	**ECA2314FAE**	2,125.	**ECA2318FAE**	1,540.
	230	1	120	HMCPE 7A	**ECA2311FAC**	1,310.	**ECA2312FAC**	1,540.	**ECA2314FAC**	2,125.	**ECA2318FAC**	1,540.
		2		HMCPE 15A	**ECA2311FAD**	1,310.	**ECA2312FAD**	1,540.	**ECA2314FAD**	2,125.	**ECA2318FAD**	1,540.
		7-1/2		HMCPE 30A	**ECA2311FAE**	1,310.	**ECA2312FAE**	1,540.	**ECA2314FAE**	2,125.	**ECA2318FAE**	1,540.
	460	3/4	120	HMCPE 3A	**ECA2311FAB**	1,310.	**ECA2312FAB**	1,540.	**ECA2314FAB**	2,125.	**ECA2318FAB**	1,540.
		2		HMCPE 7A	**ECA2311FAC**	1,310.	**ECA2312FAC**	1,540.	**ECA2314FAC**	2,125.	**ECA2318FAC**	1,540.
		5		HMCPE 15A	**ECA2311FAD**	1,310.	**ECA2312FAD**	1,540.	**ECA2314FAD**	2,125.	**ECA2318FAD**	1,540.
		10		HMCPE 30A	**ECA2311FAE**	1,310.	**ECA2312FAE**	1,540.	**ECA2314FAE**	2,125.	**ECA2318FAE**	1,540.
	575	1	120	HMCP 3A	**ECA2311FA5**	1,310.	**ECA2312FA5**	1,540.	**ECA2314FA5**	2,125.	**ECA2318FA5**	1,540.
		3		HMCP 7A	**ECA2311FA6**	1,310.	**ECA2312FA6**	1,540.	**ECA2314FA6**	2,125.	**ECA2318FA6**	1,540.
		7-1/2		HMCP 15A	**ECA2311FA7**	1,310.	**ECA2312FA7**	1,540.	**ECA2314FA7**	2,125.	**ECA2318FA7**	1,540.
		10		HMCP 30A	**ECA2311FA8**	1,310.	**ECA2312FA8**	1,540.	**ECA2314FA8**	2,125.	**ECA2318FA8**	1,540.
2	200	10	120	HMCPE 50A	**ECA2321FAF**	2,070.	**ECA2322FAF**	2,365.	**ECA2324FAF**	3,315.	**ECA2328FAF**	2,365.
	230	15										
	460	25										
	575	25	120	HMCP 50A	**ECA2321FA9**	2,070.	**ECA2322FA9**	2,365.	**ECA2324FA9**	3,315.	**ECA2328FA9**	2,365.
3	200	25	120	HMCPE 100A	**ECA2331FAG**	3,080.	**ECA2332FAG**	3,465.	**ECA2334FAG**	5,260.	**ECA2338FAG**	3,465.
	230	30										
	460	50										
	575	50										
	575	50	120	HMCP 100A	**ECA2331FAI**	3,080.	**ECA2323FAI**	3,465.	**ECA2334FAI**	5,260.	**ECA2338FAI**	3,465.
4	200	40	120	HMCP 150A	**ECA2341FAH**	6,940.	**ECA2342FAH**	8,000.	**ECA2344FAH**	9,690.	**ECA2348FAH**	8,000.
	230	50										
	460	100										
	575	100										
5	200	60	120	HMCP 250A	**ECA2351FAJ**	14,010.	**ECA2352FAJ**	16,520.	**ECA2354FAJ**	21,030.	**ECA2358FAJ**	16,520.
	230	75										
	460	150										
	575	200										
	200	75	120	HMCP 400A	**ECA2351FAK**	14,010.	**ECA2352FAK**	16,520.	**ECA2354FAK**	21,030.	**ECA2358FAK**	16,520.
	230	100										
	460	200										
6	200	150	120 ⑧	HMCP 600A	**ECA2361EAL**	30,140.	**ECA2362EAL**	31,950.	**ECA2363EAL**	33,490.	**ECA2368EAL**	31,950.
	230	150			**ECA2361BAL**	30,140.	**ECA2362BAL**	31,950.	**ECA2363BAL**	33,490.	**ECA2368BAL**	31,950.
	460	300			**ECA2361CAL**	30,140.	**ECA2362CAL**	31,950.	**ECA2363CAL**	33,490.	**ECA2368CAL**	31,950.
	575	300			**ECA2361DAL**	30,140.	**ECA2362DAL**	31,950.	**ECA2363DAL**	33,490.	**ECA23368DAL**	31,950.
	230	200	120 ⑧	MD 800A	**ECA2361BAM**	30,140.	**ECA2362BAM**	31,950.	**ECA2363BAM**	33,490.	**ECA2368BAM**	31,950.
	460	400			**ECA2361CAM**	30,140.	**ECA2362CAM**	31,950.	**ECA2363CAM**	33,490.	**ECA2368CAM**	31,950.
	575	400			**ECA2361DAM**	30,140.	**ECA2362DAM**	31,950.	**ECA2363DAM**	33,490.	**ECA2368DAM**	31,950.

① For motor full load current (FLA) range of .47A – 3.81A with a 1.15 to 1.25 service factor and for motor hp range of 1/4 hp to 2 hp at 460V.

② All starters provided with coils for separate control.

③ Starters for 50 Hz operation use 110V 50 Hz magnet coil. Change 8th character from **F** to **N**.

④ Suitable for outdoor application when properly installed — see Page i-5 of PG.3.02.T.E.

⑤ All NEMA 12 enclosures are standardized with external reset. For internal reset, order mod code **R5**.

⑥ NEMA 12 enclosure is without safety door interlock. When safety door interlock is required, change seventh character from **8** to **9**, i.e. ECA231**8**FAC would become ECA231**9**FAC.

⑦ NEMA 4X (Stainless steel) Sizes 1 – 5, NEMA 4 (Painted steel) Size 6.

⑧ Size 6 includes control power transformer.

⑨ Reversing starters have status only ACM included as standard.

Note: Reference to *Enclosed Control Product Guide* — PG.3.02.T.E.

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Discount Symbol **1CD-1C**

Table 33-178. Class ECA24 — NEMA Rated — Combination HMCP or Magnetic Trip Circuit Breaker with CPT — Non-reversing

NEMA Size	Primary Voltage ②	Max. hp Rating	Secondary Magnet Coil Voltage	Circuit Breaker Type	3-Pole NEMA 1 General Purpose		3-Pole NEMA 3R Rainproof		3-Pole NEMA 4X ⑥ Watertight & Dust-Tight Stainless or Painted Steel		3-Pole NEMA 12 Dust-Tight Industrial External Reset (NEMA 3R) ③④⑤	
					Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
1 ①	200	1	120	HMCPE 7A	**ECA24L1EAC**	1,102.	**ECA24L2EAC**	1,262.	**ECA24L4EAC**	1,737.	**ECA24L8EAC**	1,262.
	230	1		HMCPE 7A	**ECA24L1BAC**	1,102.	**ECA24L2BAC**	1,262.	**ECA24L4BAC**	1,737.	**ECA24L8BAC**	1,262.
	460	3/4		HMCPE 3A	**ECA24L1CAB**	1,102.	**ECA24L2CAB**	1,262.	**ECA24L4CAB**	1,737.	**ECA24L8CAB**	1,262.
		2		HMCPE 7A	**ECA24L1CAC**	1,102.	**ECA24L2CAC**	1,262.	**ECA24L4CAC**	1,737.	**ECA24L8CAC**	1,262.
	575	1	120	HMCP 3A	**ECA24L1DA5**	1,102.	**ECA24L2DA5**	1,262.	**ECA24L4DA5**	1,737.	**ECA24L8DA5**	1,262.
		2		HMCP 7A	**ECA24L1DA6**	1,102.	**ECA24L2DA6**	1,262.	**ECA24L4DA6**	1,737.	**ECA24L8DA6**	1,262.
1	200	1	120	HMCPE 7A	**ECA2411EAC**	1,102.	**ECA2412EAC**	1,262.	**ECA2414EAC**	1,737.	**ECA2418EAC**	1,262.
		2		HMCPE 15A	**ECA2411EAD**	1,102.	**ECA2412EAD**	1,262.	**ECA2414EAD**	1,737.	**ECA2418EAD**	1,262.
		7-1/2		HMCPE 30A	**ECA2411EAE**	1,102.	**ECA2412EAE**	1,262.	**ECA2414EAE**	1,737.	**ECA2418EAE**	1,262.
	230	1	120	HMCPE 7A	**ECA2411BAC**	1,102.	**ECA2412BAC**	1,262.	**ECA2414BAC**	1,737.	**ECA2418BAC**	1,262.
		2		HMCPE 15A	**ECA2411BAD**	1,102.	**ECA2412BAD**	1,262.	**ECA2414BAD**	1,737.	**ECA2418BAD**	1,262.
		7-1/2		HMCPE 30A	**ECA2411BAE**	1,102.	**ECA2412BAE**	1,262.	**ECA2414BAE**	1,737.	**ECA2418BAE**	1,262.
	460	3/4	120	HMCPE 3A	**ECA2411CAB**	1,102.	**ECA2412CAB**	1,262.	**ECA2414CAB**	1,737.	**ECA2418CAB**	1,262.
		2		HMCPE 7A	**ECA2411CAC**	1,102.	**ECA2412CAC**	1,262.	**ECA2414CAC**	1,737.	**ECA2418CAC**	1,262.
		5		HMCPE 15A	**ECA2411CAD**	1,102.	**ECA2412CAD**	1,262.	**ECA2414CAD**	1,737.	**ECA2418CAD**	1,262.
		10		HMCPE 30A	**ECA2411CAE**	1,102.	**ECA2412CAE**	1,262.	**ECA2414CAE**	1,737.	**ECA2418CAE**	1,262.
	575	1	120	HMCP 3A	**ECA2411DA5**	1,102.	**ECA2412DA5**	1,262.	**ECA2414DA5**	1,737.	**ECA2418DA5**	1,262.
		3		HMCP 7A	**ECA2411DA6**	1,102.	**ECA2412DA6**	1,262.	**ECA2414DA6**	1,737.	**ECA2418DA6**	1,262.
		7-1/2		HMCP 15A	**ECA2411DA7**	1,102.	**ECA2412DA7**	1,262.	**ECA2414DA7**	1,737.	**ECA2418DA7**	1,262.
		10		HMCP 30A	**ECA2411DA8**	1,102.	**ECA2412DA8**	1,262.	**ECA2414DA8**	1,737.	**ECA2418DA8**	1,262.
2	200	10	120	HMCPE 50A	**ECA2421EAF**	1,540.	**ECA2422EAF**	1,770.	**ECA2424EAF**	2,525.	**ECA2428EAF**	1,770.
	230	15			**ECA2421BAF**	1,540.	**ECA2422BAF**	1,770.	**ECA2424BAF**	2,525.	**ECA2428BAF**	1,770.
	460	25			**ECA2421CAF**	1,540.	**ECA2422CAF**	1,770.	**ECA2424CAF**	2,525.	**ECA2428CAF**	1,770.
	575	25	120	HMCP 50A	**ECA2421DA9**	1,540.	**ECA2422DA9**	1,770.	**ECA2424DA9**	2,525.	**ECA2428DA9**	1,770.
3	200	25	120	HMCPE	**ECA2431EAG**	2,230.	**ECA2432EAG**	2,525.	**ECA2434EAG**	3,720.	**ECA2438EAG**	2,525.
	230	30		100A	**ECA2431BAG**	2,230.	**ECA2432BAG**	2,525.	**ECA2434BAG**	3,720.	**ECA2438BAG**	2,525.
	460	50			**ECA2431CAG**	2,230.	**ECA2432CAG**	2,525.	**ECA2434CAG**	3,720.	**ECA2438CAG**	2,525.
	575	50	120	HMCP 100A	**ECA2431DAI**	2,230.	**ECA2432DAI**	2,525.	**ECA2434DAI**	3,720.	**ECA2438DAI**	2,525.
4	200	40	120	HMCP 150A	**ECA2441EAH**	4,475.	**ECA2442EAH**	5,290.	**ECA2444EAH**	6,685.	**ECA2448EAH**	5,290.
	230	50			**ECA2441BAH**	4,475.	**ECA2442BAH**	5,290.	**ECA2444BAH**	6,685.	**ECA2448BAH**	5,290.
	460	100			**ECA2441CAH**	4,475.	**ECA2442CAH**	5,290.	**ECA2444CAH**	6,685.	**ECA2448CAH**	5,290.
	575	100			**ECA2441DAH**	4,475.	**ECA2442DAH**	5,290.	**ECA2444DAH**	6,685.	**ECA2448DAH**	5,290.
5	200	60	120	HMCP 250A	**ECA2451EAJ**	9,805.	**ECA2452EAJ**	11,265.	**ECA2454EAJ**	15,415.	**ECA2458EAJ**	11,265.
	230	75			**ECA2451BAJ**	9,805.	**ECA2452BAJ**	11,265.	**ECA2454BAJ**	15,415.	**ECA2458BAJ**	11,265.
	460	150			**ECA2451CAJ**	9,805.	**ECA2452CAJ**	11,265.	**ECA2454CAJ**	15,415.	**ECA2458CAJ**	11,265.
	575	200			**ECA2451DAJ**	9,805.	**ECA2452DAJ**	11,265.	**ECA2454DAJ**	15,415.	**ECA2458DAJ**	11,265.
	200	75	120	HMCP 400A	**ECA2451EAK**	9,805.	**ECA2452EAK**	11,265.	**ECA2454EAK**	15,415.	**ECA2458EAK**	11,265.
	230	100			**ECA2451BAK**	9,805.	**ECA2452BAK**	11,265.	**ECA2454BAK**	15,415.	**ECA2458BAK**	11,265.
	460	200			**ECA2451CAK**	9,805.	**ECA2452CAK**	11,265.	**ECA2454CAK**	15,415.	**ECA2458CAK**	11,265.
6	200	150	120	HMCP 600A	**ECA2461EAL**	20,590.	**ECA2462EAL**	22,570.	**ECA2463EAL**	24,100.	**ECA2468EAL**	22,570.
	230	150			**ECA2461BAL**	20,590.	**ECA2462BAL**	22,570.	**ECA2463BAL**	24,100.	**ECA2468BAL**	22,570.
	460	300			**ECA2461CAL**	20,590.	**ECA2462CAL**	22,570.	**ECA2463CAL**	24,100.	**ECA2468CAL**	22,570.
	575	300			**ECA2461DAL**	20,590.	**ECA2462DAL**	22,570.	**ECA2463DAL**	24,100.	**ECA2468DAL**	22,570.
	230	200	120	MD 800A	**ECA2461BAM**	20,590.	**ECA2462BAM**	22,570.	**ECA2463BAM**	24,100.	**ECA2468BAM**	22,570.
	460	400			**ECA2461CAM**	20,590.	**ECA2462CAM**	22,570.	**ECA2463CAM**	24,100.	**ECA2468CAM**	22,570.
	575	400			**ECA2461DAM**	20,590.	**ECA2462DAM**	22,570.	**ECA2463DAM**	24,100.	**ECA2468DAM**	22,570.

① For motor full load current (FLA) range of .47A – 3.81A with a 1.15 to 1.25 service factor and for motor hp range of 1/4 hp to 2 hp at 460V.

② Other control power transformer primary voltages, see **Page 33-103**.

③ Suitable for outdoor application when properly installed — see Page i-5 of PG.3.02.T.E.

④ All NEMA 12 enclosures are standardized with external reset. For internal reset, order mod code **R5**.

⑤ NEMA 12 enclosure is without safety door interlock. When safety door interlock is required, change seventh character from **8** to **9**, i.e. ECA241**8**EAC would become ECA241**9**EAC.

⑥ NEMA 4X (Stainless steel) Sizes 1 – 5, NEMA 4 (Painted steel) Size 6.

Note: Reference to *Enclosed Control Product Guide* — PG.3.02.T.E.

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Discount Symbol **1CD-1C**

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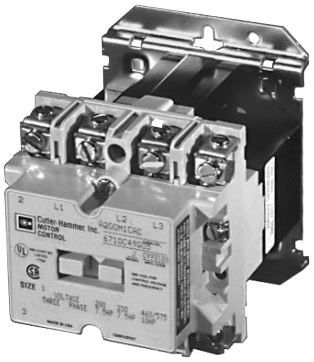


Size 1 Contactor

Product Description — Sizes 00 – 4

Application

Magnetic contactors are used to switch transformers and capacitors and to control electrical power circuits such as heating, lighting and motors that require no overload protection, or where overload protection is separately provided. They can be operated remotely by manual or automatic pilot devices.

Class A201 Contactors, Sizes 00 – 4; Three-Phase, 1-1/2 – 100 hp

A201 magnetic contactors are 600V rated devices available in NEMA Sizes 00 – 4, 10A through 150A (open rating). Product features include:

- Straight-through wiring to line and load terminals located up front for ease of installation.
- Moving and stationary contacts are front accessible, simplifying inspection and maintenance.
- Reliable U-shaped magnet for reduced power consumption.
- Coil design reduces inventory/maintenance expenses. For a given voltage, one size coil fits all contactors Sizes 00 – 2, and a second coil fits three-pole Model J Sizes 3 and 4. Model K coils are different design.

A201 contactors have normally open holding circuit interlocks which are supplied as standard.

Panel layout and drilling are simplified through the use of common backplates, one for Sizes 00 – 2 and one for Sizes 3 – 4. In addition, panel space is reduced dramatically through the use of unique corner cavities for mounting the wide variety of modifications shown on **Page 33-133**.

For reversing applications, two contactors are supplied on a common base with electrical and mechanical interlocks which prevent both contactors from being closed at the same time.

A201 contactors are UL listed components and also have CSA certification.

Technical Data . . . . . **Pages 33-129 – 33-132**

Size 5 Contactor

Product Description — Sizes 5 – 9

Class A201, Contactors, Sizes 5 – 9; Three-Phase, Over 100 hp

These AC magnetic contactors utilize clapper design and feature straight-through wiring.

Contacts are silver alloy for longer life. The contacts close with optimum wiping action which serves to keep the contacting surfaces clean. De-ion® arc quenchers draw the arc away from the contacts at opening, which reduces burning and pitting and increases contact life.

All of the contactors are complete with one unwired, normally-open (NO) auxiliary contact mounted and have accommodations for additional auxiliary contacts. No control circuit wiring or terminal markings are included.

Size 5, 300A, 600V, Open
Size 6, 600A, 600V, Open

Class A201 Size 5 and 6 contactors are front clapper design, AC operated with the armature pivoting on dual needle bearings which assure accurate contact alignment.

The contactor base is molded of a high impact, non-tracking, non-hygroscopic glass polyester material permitting front mounting and wiring on a steel panel.

Floating magnet assures quiet operation.

Size 5 and 6 contactors must be mounted with the line terminals directly above the load terminals.

Multi-voltage coil ratings allow selection of the voltage which closely matches the actual system voltage to assure optimum contactor operation.

Each contactor accommodates two Type J11 auxiliary contacts, providing up to four auxiliary circuits, normally-open or normally-closed (NO and NC).

A201 Size 5 and 6 contactors and starters are UL recognized when supplied without terminals. When supplied with terminals, the devices are UL listed.

Two special configurations of the Class A201 Size 5 and 6 contactors are available:

- **Latched Design** — This is a mechanically held, electrically released device. It is applied where the contactor must remain closed during extreme voltage fluctuations or power failure. It is also suitable for applications requiring quiet operation since the operating coil is de-energized when the contactor is closed. The latch assembly consists of a mechanical latch mechanism, electrically operated AC trip solenoid and a clearing contact.
- **DC Operated** — This device is DC operated. It is used where low drop-out voltage or exceptionally quiet operation is desired. The DC assembly consists of a DC operating coil, integrally mounted rectifier and shorting contact.

Size 7, 900A, 600V, Open
Size 8, 1350A, 600V, Open
Size 9, 2500A, 600V, Open

Class A201 Size 7 and 8 contactors are DC operated side clapper design with the shaft mounted on dual needle bearings to ensure positive contact alignment and long contact life.

A steel panel base permits mounting on angle or channel without additional support, for versatile low cost installation.

Each stationary contact assembly is mounted on an individual molded insulator. Each pair of contacts is surrounded by a De-ion grid type arc quencher for rapid and confined arc interruption and long contact life.

The shunt for each pole is made of flexible, braided copper cable for freedom of movement and long life.

The rugged DC operating coils are designed to operate at high temperature and insulated to meet Class H service.

An integrally mounted avalanche type silicon rectifier supplies DC coil voltage from the AC control circuit.

Sizes 7 and 8 accommodate three Type L-63 auxiliary contacts which are easily converted from normally-open to normally-closed, providing auxiliary circuit flexibility. Size 9 uses L-64 auxiliary contacts with a total of four circuits.

A201 Size 7, 8 and 9 contactors and starters are UL recognized when supplied without terminals. When supplied with terminals, the devices are UL listed.

Instructional Leaflets

16960B	Sizes 00 – 1 Magnetic Contactor, Non-reversing or Reversing
16961E	Size 2 Magnetic Contactor, Non-reversing or Reversing
13238G	Size 3 Magnetic Contactor, Non-reversing or Reversing
17001C	Size 4 Magnetic Contactor, Non-reversing or Reversing
17049D	Size 5 Magnetic Contactor, Non-reversing or Reversing
17053B	Size 6 Magnetic Contactor, Non-reversing or Reversing
17048	Sizes 7 – 8 Magnetic Contactor, Non-reversing or Reversing
16978	Size 9 Magnetic Contactor, Non-reversing or Reversing

Technical Data . . . . . **Pages 33-129 – 33-132**

Dimensions and Shipping Weights

Not to be used for construction purposes unless approved.

Table 33-179. Non-reversing Open Contactors Dimensions

NEMA Size	No. of Poles	Fig.	Mounting Screws		Approximate Dimensions in Inches (mm)								Weight, Lbs. (kg)
			No.	Size	A	B	C	D	E	F	G	H	
00, 0, 1	2 – 4	A	3	#10	3.31 (84.1)	4.38 (111.3)	4.61 (117.1)	3.95 (100.3)	1.50 (38.1)	1.66 (42.2)	.23 (5.8)	—	2.6 (1.2)
	5	A	3	#10	4.19 (106.4)	4.38 (111.3)	4.61 (117.1)	3.95 (100.3)	1.50 (38.1)	2.09 (53.1)	.23 (5.8)	—	3.2 (1.5)
2	2, 3	A	3	#10	3.31 (84.1)	4.38 (111.3)	4.94 (125.5)	3.95 (100.3)	1.50 (38.1)	1.66 (42.2)	.23 (5.8)	—	3.3 (1.5)
	4, 5	A	3	#10	5.06 (128.5)	4.38 (111.3)	4.94 (125.5)	3.95 (100.3)	1.50 (38.1)	2.53 (64.3)	.23 (5.8)	—	4.5 (2.0)
3, 4	2, 3	A	3	1/4 in.	4.63 (117.6)	6.63 (168.4)	6.75 (171.5)	6.00 (152.4)	1.88 (47.8)	2.31 (58.7)	.38 (9.7)	—	9.3 (4.2)
	4, 5	A	3	1/4 in.	7.25 (184.2)	6.63 (168.4)	6.75 (171.5)	6.00 (152.4)	1.88 (47.8)	3.63 (92.2)	.38 (9.7)	—	13.0 (5.9)
5	2, 3	B	4	3/8 in.	7.22 (183.4)	12.00 (304.8)	7.75 (196.9)	11.00 (279.4)	2.75 (69.9)	—	.59 (15.0)	2.22 (56.4)	25.0 (11.4)
6	2, 3	C	4	3/8 in.	7.22 (183.4)	13.50 (342.9)	9.50 (251.3)	11.00 (279.4)	2.75 (69.9)	—	.59 (15.0)	2.22 (56.4)	42.0 (19.1)
7	3	D	4	3/8 in.	23.50 (596.9)	18.63 (473.2)	11.00 (279.4)	12.00 (304.8)	22.00 (558.8)	—	5.63 (143.0)	.75 (19.1)	215.0 (97.6)
8	3	D	4	3/8 in.	23.50 (596.9)	19.25 (489.0)	11.00 (279.4)	12.00 (304.8)	22.00 (558.8)	—	5.63 (143.0)	.75 (19.1)	265.0 (120.3)
9	3	D	4	1/2 in.	33.00 (838.2)	29.75 (755.7)	12.94 (328.7)	8.00 (203.2)	30.75 (781.1)	—	14.50 (368.3)	1.63 (41.4)	315.0 (143.0)

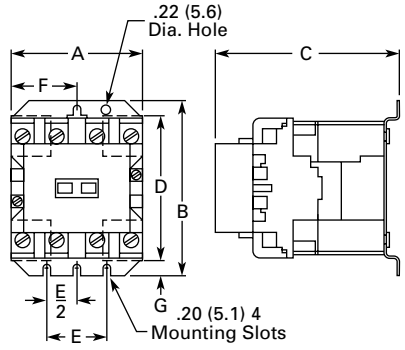


Figure A
Sizes 00 – 4 A201 Contactors

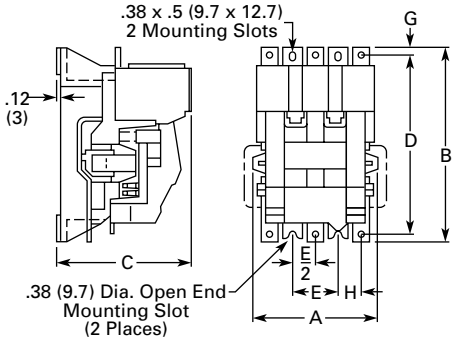


Figure B
Size 5

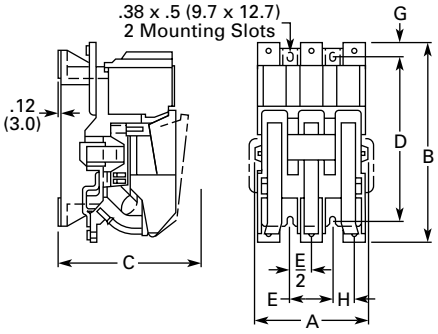


Figure C
Size 6

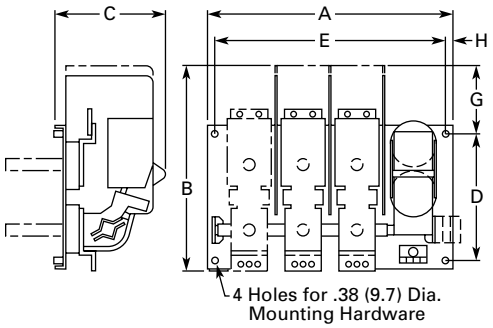


Figure D
Sizes 7 – 9

Figure 33-47. Non-reversing Open Contactors Dimensions

Not to be used for construction purposes unless approved.

Table 33-180. Reversing Open Contactors Dimensions

NEMA Size	No. of Poles	Fig.	Mounting Screws		Approximate Dimensions in Inches (mm)								Weight, Lbs. (kg)
			No.	Size	A	B	C	D	E	F	G	H	
00, 0, 1	3 x 3 H.	A	3	#10	7.13 (181.1)	4.45 (113.0)	5.05 (128.3)	3.95 (100.3)	5.31 (134.9)	3.56 (90.4)	.25 (6.4)	—	7.8 (3.5)
	3 x 3 V.	B	3	#10	3.33 (84.6)	9.61 (244.1)	5.05 (128.3)	9.08 (230.6)	2.16 (54.9)	.75 (19.1)	.25 (6.4)	4.52 (114.8)	8.9 (4.0)
2	3 x 3 H.	A	3	#10	7.13 (181.1)	4.45 (113.0)	5.38 (136.7)	3.95 (100.3)	5.31 (134.9)	3.56 (90.4)	.25 (6.4)	—	9.1 (4.1)
	3 x 3 V.	B	3	#10	3.33 (84.6)	9.61 (244.1)	5.38 (136.7)	9.08 (230.6)	2.16 (54.9)	.75 (19.1)	.25 (6.4)	4.52 (114.8)	10.0 (4.5)
3, 4	3 x 3 H.	A	3	1/4 in.	9.75 (247.7)	6.88 (174.8)	7.25 (184.2)	6.00 (152.4)	7.00 (177.8)	4.88 (124.0)	.44 (11.2)	—	24.0 (10.9)
	3 x 3 V.	B	3	1/4 in.	4.63 (117.6)	16.56 (420.6)	7.25 (184.2)	15.69 (398.5)	2.75 (69.9)	.94 (23.9)	.44 (11.2)	7.78 (197.6)	25.0 (11.4)
5	3 x 3 H.	C	8	3/8 in.	17.22 (437.4)	12.00 (304.8)	7.75 (196.9)	11.00 (279.4)	2.75 (69.9)	10.00 (254.0)	.59 (15.0)	1.38 (35.1)	55.0 (25.0)
	3 x 3 V.	D	8	3/8 in.	8.25 (209.6)	30.00 (762.0)	7.75 (196.9)	18.00 (457.8)	2.75 (69.9)	—	—	1.38 (35.1)	55.0 (26.0)
6	3 x 3 H.	C	8	3/8 in.	17.22 (437.4)	13.50 (342.9)	8.75 (222.3)	11.00 (279.4)	2.75 (69.9)	10.00 (254.0)	.59 (15.0)	1.38 (35.1)	90.0 (40.9)
	3 x 3 V.	D	8	3/8 in.	8.25 (209.6)	41.50 (1054.1)	8.75 (222.3)	28.00 (711.2)	2.75 (69.9)	—	—	1.38 (35.1)	90.0 (40.9)
7	3 x 3 V.	E	8	3/8 in.	23.50 (596.9)	38.63 (981.2)	11.00 (279.4)	20.00 (508.0)	22.00 (558.8)	—	5.63 (143.0)	.75 (19.1)	450.0 (204.3)
8	3 x 3 V.	E	8	3/8 in.	23.50 (596.9)	39.25 (997.0)	11.00 (279.4)	20.00 (508.0)	22.00 (558.8)	—	5.63 (143.0)	.75 (19.1)	550.0 (249.7)
9	3 x 3 V.	E	8	1/2 in.	33.00 (838.2)	62.75 (1593.9)	12.94 (328.7)	33.00 (838.2)	30.75 (781.1)	—	14.50 (368.3)	1.63 (41.4)	650.0 (295.1)

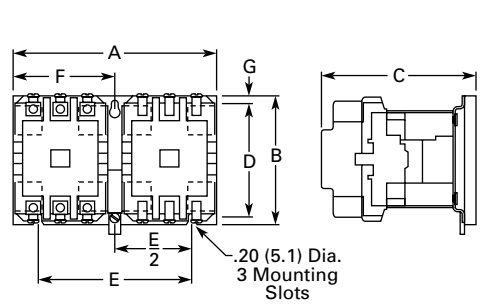


Figure A
Sizes 00 – 4 Horizontal

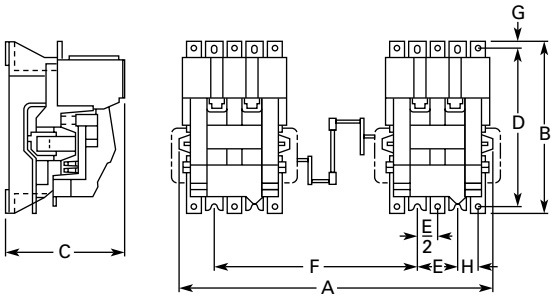


Figure C
Sizes 5, 6 Horizontal

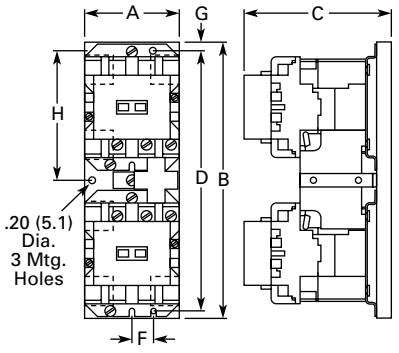


Figure B
Sizes 00 – 4 Vertical

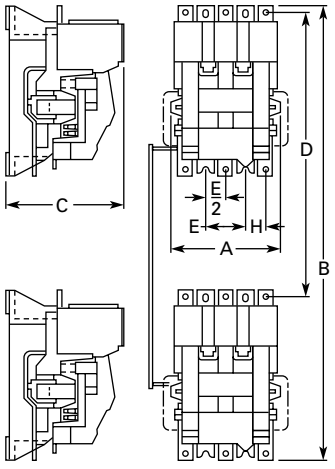


Figure D
Sizes 5, 6 Vertical

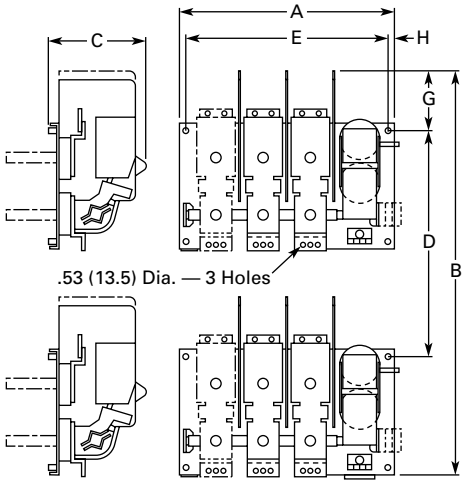
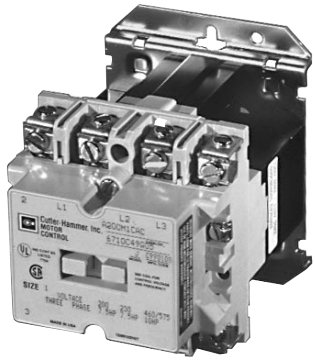


Figure E
Sizes 7 – 9 Vertical

Figure 33-48. Reversing Open Contactors Dimensions



A201 Size 1

Product Selection — Non-reversing, Sizes 00 – 9

When Ordering Specify

Order by Catalog Number from **Table 33-181**, plus Suffix for coil voltages, verifying usage of appropriate sizes.

Table 33-181. Front Connected Contactors Selection

Size	Amps	Max. UL Horsepower						2 Poles		3 Poles		4 Poles		5 Poles	
		1-Phase		3-Phase				Open Catalog Number	Price U.S. $	Open Catalog Number	Price U.S. $	Open Catalog Number	Price U.S. $	Open Catalog Number	Price U.S. $
		115V	230V	208V	240V	480V	600V								
Sizes 00 – 6															
00	9	1/3	1	1-1/2	1-1/2	2	2	**A201KAB_**	143.	**A201KAC_**	164.	**A201KAD_**	220.	**A201KAE_**	300.
0	18	1	2	3	3	5	5	**A201K0B_**	185.	**A201K0C_**	207.	**A201K0D_**	263.	**A201K0E_**	343.
1	27	2	3	7-1/2	7-1/2	10	10	**A201K1B_**	220.	**A201K1C_**	242.	**A201K1D_**	299.	**A201K1E_**	377.
2	45	3	7-1/2	10	15	25	25	**A201K2B_**	412.	**A201K2C_**	440.	**A201K2D_**	580.	**A201K2E_**	860.
3	90	—	—	25	30	50	50	**A201K3B_**	660.	**A201K3C_**	715.	**A201K3D_**	915.	**A201K3E_**	1,370.
4	135	—	—	40	50	100	100	**A201K4B_**	1,580.	**A201K4C_**	1,715.	**A201K4D_**	2,388.	**A201K4E_**	3,285.
5	270	—	—	75	100	200	200	**A201K5B_**	3,420.	**A201K5C_**	3,715.	**—**	—	**—**	—
6	540	—	—	150	200	400	400	**A201K6B_**	8,680.	**A201K6C_**	10,140.	**—**	—	**—**	—
Sizes 7 – 9															
7 ①	810	—	—	200	300	600	600	**A201K7B_**	12,675.	**A201K7C_**	14,460.	**—**	—	**—**	—
8 ①	1215	—	—	400	450	900	900	**A201K8B_**	20,340.	**A201K8C_**	22,320.	**—**	—	**—**	—
9 ①	2250	—	—	—	800	1600	—	**A201K9B_**	22,240.	**A201K9C_Z1** ②③	30,910.	**—**	—	**—**	—

① Sizes 7 – 9 use rectifier with DC coil.
② For Size 9, only available coil voltage is 120V.
③ Supplied without terminal lugs.

Table 33-182. Rear Connected Contactors Selection

120 Volt Rectified Coil/Open Only		
Size	**Catalog Number**	**Price U.S.**
7	**A201K7CJ29**	15,530.
8	**A201K8CJZ9**	23,750.
9	**A201K9CJZ1Z4**	32,000.

Table 33-183. Coils for Sizes 00 – 6

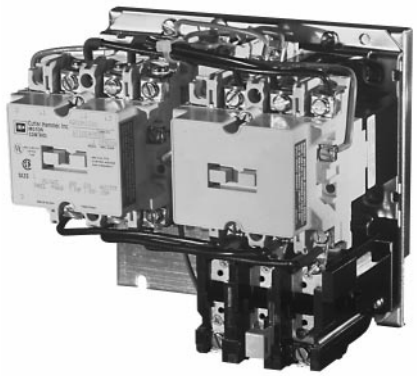
Coil Volts and Hz	Code Suffix
120/60 or 110/50	**A**
200 – 208/60	**B**
240/60	**W**
480/60	**X**
600/60	**E**

Table 33-184. Coils for Sizes 7, 8 and 9 ④

Coil Volts and Hz	Code Suffix
110 – 120/50 or 60	**J**
220 – 240/50 or 60	**K**
440 – 480/50 or 60	**U**
600/60	**E**

④ For Size 9, only available coil voltage is 120V.

Modification Kits, Accessories . . . . . **Pages 33-133 – 33-135**
Factory Modifications . . . . **Page 33-133**
Other Coil Voltages . . . . . **Page 33-132**
Technical Data. . . . . **Pages 33-129 – 33-132**
Dimensions. . . . . **Page 33-117**
Discount Symbol **1CD1**



Size 1 Horizontal Reversing Contactor

Product Selection — Reversing, Sizes 00 – 9

When Ordering Specify

Order by Catalog Number from **Table 33-185**, plus Suffix for coil voltages, verifying usage of appropriate sizes.

Class A211 Reversing Contactors — Horizontally Mounted
Class A251 Reversing Contactors — Vertically Mounted

Table 33-185. Reversing Contactors Selection

Size	Amps	Max. UL Horsepower						Horizontal Design		Vertical Design	
		1-Phase		3-Phase				Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
		115V	230V	208V	240V	480V	600V				
Sizes 0 – 6											
0	18	1	2	3	3	5	5	**A211K0C_**	515.	**A251K0C_**	515.
1	27	2	3	7-1/2	7-1/2	10	10	**A211K1C_**	590.	**A251K1C_**	590.
2	45	3	7-1/2	10	15	25	25	**A211K2C_**	1,115.	**A251K2C_**	1,115.
3	90	—	—	25	30	50	50	**A211K3C_**	1,845.	**A251K3C_**	1,845.
4	135	—	—	40	50	100	100	**A211K4C_**	4,590.	**A251K4C_**	4,590.
5	270	—	—	75	100	200	200	**A211K5C_**	8,415.	**A251K5C_**	8,415.
6	540	—	—	150	200	400	400	**A211K6C_**	21,000.	**A251K6C_**	21,000.
Sizes 7 – 9											
7 ①	810	—	—	200	300	600	600	**—**	—	**A251K7C_**	29,800.
8 ①	1215	—	—	400	450	900	900	**—**	—	**A251K8C_**	46,150.
9 ①	2250	—	—	—	800	1600	—	**—**	—	**A251K9C_** ②	61,800.

① Sizes 7 – 9 use rectifier with DC coil.
② For Size 9, only available coil voltage is 120V.

Table 33-186. Coils for Sizes 00 – 6

Coil Volts and Hz	Code Suffix
120/60 or 110/50	**A**
200 – 208/60	**B**
240/60	**W**
480/60	**X**
600/60	**E**

Table 33-187. Coils for Sizes 7, 8 and 9 ③

Coil Volts and Hz	Code Suffix
110 – 120/50 or 60	**J**
220 – 240/50 or 60	**K**
440 – 480/50 or 60	**U**
600/60	**E**

③ For Size 9, only available coil voltage is 120V.

Modification Kits, Accessories . . . . . **Pages 33-133 – 33-135**
Factory Modifications. . . . . **Page 33-133**
Other Coil Voltages . . . . . **Page 33-132**
Technical Data . . . . . **Pages 33-129 – 33-132**
Dimensions . . . . . **Page 33-118**
Discount Symbol **1CD1**

Contents

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Product Description — Sizes 5 – 9	**33-121**
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Instructional Leaflets	**33-122**
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Starters — Two-Speed	**33-128**
Technical Data	**33-129**
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Size 1 Starter

Product Description — Sizes 00 – 4

General

Magnetic starters are used for full-voltage, across-the-line starting and stopping of squirrel cage motors. They can be operated locally or remotely by manual or automatic pilot devices.

NEMA Sizes 00 – 4; Three-Phase, 1-1/2 – 100 hp

These starters use Class A201 contactors as described on **Page 33-115**. Contactor features are enhanced through the ability to provide positive motor protection in the form of several types of overload relays. See **Pages 33-141** – **33-149**.

Type B Overload Relay, Manual Reset Only

Supplied as standard on Class A200 and A900 starters (two-speed). The bimetallic overload relay offers ambient compensation and trip-to-test feature (relay contact status check) as standard. In addition, an isolated normally-open contact is available in kit form for customer mounting. Type B overload relays are manual reset only.

Type A Overload Relay, Manual or Automatic Reset

This is an optional overload relay, offering the capability of field conversion to automatic reset. It is available as an ambient compensated or non-compensated type.

Non-reversing Starters

Non-reversing starters are supplied as open devices. All starters are supplied with a normally-open holding circuit interlock.

Class A200 starters are available as UL listed or recognized components, as well as with CSA certification.

Reversing Starters

For reversing applications (Class A210), a starter and a contactor electrically and mechanically interlocked are supplied on a common baseplate. Reversing starters are used to start, stop and reverse AC squirrel cage motors and for primary control of reversing wound-rotor motors.

For plugging or inching, when operations exceed five times per minute, decreased horsepower ratings in accordance with NEMA Standard ICS 2-321 are recommended.

Two-Speed Starters, A900s

For across-the-line starting of two-speed constant hp, constant torque and variable torque squirrel cage motors, two-speed starters (Class A900) are available. These starters consist of two starters, one for each motor speed, mechanically and electrically interlocked and wired for manual speed selection by means of pushbuttons. Auxiliary relays may be added to provide automatic acceleration or deceleration.

Starters for two-speed, two independent winding motors consist of two-, three- or four-pole starters electrically and mechanically interlocked. Starters for two-speed, single reconnectable winding motors consist of one three-pole and one five-pole starter mechanically and electrically interlocked.

Size 5 Starter

Product Description — Sizes 5 – 9

NEMA Sizes 5 – 9; Three-Phase 75 to 1600 hp

Non-reversing (Class A200), and reversing (Classes A210, A250) full voltage starters are used for across-the-line starting of squirrel cage induction motors. They are used with motors rated above 50 hp at 230V, and above 100 hp at 460 through 600V.

Sizes 5 and 6 starters use Class A201 contactors as described on **Page 33-116**. In addition to standard motor starters, special application devices are available: Sizes 5 and 6 starters with integrally rectified AC to DC coils for applications where low voltage problems are prevalent are available.

Class A200 starters are UL listed and recognized and also carry CSA certification.

Front Removable Parts — All operating parts can be removed quickly and easily from the front. Straight-through wiring and conveniently located connection points for external wires and cables minimize installation time.

Type B Block Type Thermal Overload Relay — Dependable overload protection is assured by these snap-action, manual reset relays. Automatic reset Type A relays are available as an option.

Technical Data ..... **Pages 33-129** – **33-132**

Types of Starters

Class A200, Sizes 5 and 6 — Non-reversing starters contain an AC magnetically-operated Size 5 or Size 6 line contactor and block Type B three-pole overload relay, along with three current transformers. A control relay whose contacts handle the coil current of the starter is provided with Size 6 starters.

Class A200, Sizes 7, 8 and 9 — Non-reversing starters contain a DC operated line contactor, DC power supply, block Type B three-pole overload relay with three current transformers and a control relay.

Class A960/A970/A980 Multi-Speed Starters: Refer to **Page 33-128**.

Features and Benefits

Sizes 00 – 4

- **Straight-Through Wiring, Up-Front, Out-Front Terminals** for ease in installation.
- **Unique Accessory Mounting Cavities** reduce panel space requirements.
- **Snap-in Accessories** for application flexibility.
- **Vertical and Horizontal Interlocking** capability increases application flexibility.
- **Ambient Compensated Overload Relays** available as standard, offering superior motor protection in variable motor/controller environments.
- **Isolated Normally Open Relay Contact** available in kit mounting form on Type B Overload Relay.

Sizes 5 – 9

- **Rectified AC/DC Coils** available to reduce premature drop-out or "kiss" problems due to inherent low voltage conditions.
- **Clapper Design** armature assembly pivots on needle bearings resulting in quick, smooth opening and closing of the magnet.
- **Stainless Steel Kick-Out Spring** assures quick, positive drop-out time.
- **Front Removable Parts** all current carrying parts front removable for easy inspection and maintenance.

Instructional Leaflets

16958	Sizes 00 – 1, 3-Pole Motor Controller
16956	Sizes 00 – 1, 2-Pole, Single-Phase Motor Controller
16959	Size 2, 3-Pole Motor Controller
16957	Size 2, 2-Pole, Single-Phase Motor Controller
15465C	Sizes 3 and 4J Motor Controller
17000C	Size 4, Model K Motor Controller
17054C	Size 5 Motor Controller
17055C	Size 6 Motor Controller

Technical Data . . . . . **Pages 33-129 – 33-132**

Dimensions and Shipping Weights

Not to be used for construction purposes unless approved.

Table 33-188. Open Non-reversing Starters Dimensions

NEMA Size	No. of Poles	Fig.	Mounting Screws		Dimensions in Inches (mm)												Weight, Lbs. (kg)
			No.	Size	A	B	C	D	E	F	G	H	J	K	L	M	
00, 0, 1	2, 3	A	3	#10	3.31 (84.1)	6.42 (163.1)	4.61 (117.1)	6.00 (152.4)	1.88 (47.8)	1.66 (42.2)	.23 (5.8)	—	.39 (9.9)	.59 (15.0)	4.48 (113.8)	.27 (6.9)	35.0 (15.9)
2	2, 3	A	3	#10	3.31 (84.1)	7.17 (182.1)	4.94 (125.5)	6.75 (171.5)	1.88 (47.8)	1.66 (42.2)	.23 (5.8)	—	.41 (10.4)	.77 (19.6)	4.53 (115.1)	.27 (6.9)	43.0 (19.5)
3, 4	2, 3	A	3	1/4 in.	4.63 (117.6)	9.94 (252.5)	6.75 (171.5)	9.25 (235.0)	2.88 (73.2)	.94 (23.9)	.38 (9.7)	—	.55 (14.0)	.80 (20.3)	6.36 (161.5)	.27 (6.9)	115.0 (52.2)
5	3	B	4	3/8 in.	7.59 (192.8)	16.22 (412.0)	7.75 (196.9)	11.00 (279.4)	2.75 (69.9)	3.81 (96.8)	2.69 (68.3)	2.42 (61.5)	.33 (8.4)	.33 (8.4)	7.00 (177.8)	.27 (6.9)	29.0 (13.2)
6	3	C	4	3/8 in.	9.25 (235.0)	23.50 (596.9)	9.50 (241.3)	11.00 (279.4)	2.75 (69.9)	4.81 (122.2)	2.75 (69.9)	3.06 (77.7)	—	6.50 (165.1)	8.44 (214.4)	.27 (6.9)	55.0 (25.0)
7	3	①	①	①	37.88 (962.2)	21.50 (546.1)	11.75 (298.5)	—	—	—	—	—	—	—	—	—	—
8	3	①	①	①	37.88 (962.2)	21.50 (546.1)	11.75 (298.5)	—	—	—	—	—	—	—	—	—	—
9	3	①															

① Refer to factory.

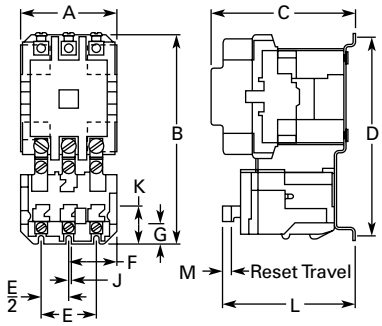


Figure A, Sizes 00 – 4

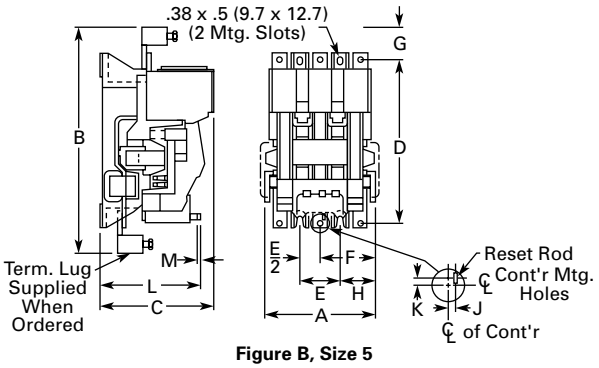


Figure B, Size 5

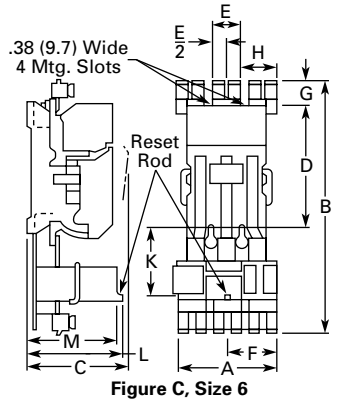


Figure C, Size 6

Figure 33-49. Open Non-reversing Starters Dimensions

Not to be used for construction purposes unless approved.

Table 33-189. Open Reversing Starters Dimensions

NEMA Size	Number of Poles	Fig.	Mounting Screws		Dimensions in Inches (mm)												Weight, Lbs. (kg)
			No.	Size	A	B	C	D	E	F	G	J	K	L	M	N	
00, 0, 1	3 x 3 Horiz.	A	3	#10	7.13 (181.1)	6.50 (165.1)	5.05 (128.3)	6.00 (152.4)	5.69 (144.5)	3.56 (90.4)	.25 (6.4)	2.3 (58.4)	.59 (15.0)	4.92 (125.0)	.27 (6.9)	—	9.0 (4.0)
	3 x 3 Vert.	B	3	#10	3.33 (84.6)	11.63 (295.4)	5.05 (128.3)	11.13 (282.7)	1.88 (47.8)	1.66 (42.2)	.25 (6.4)	.39 (9.9)	.59 (15.0)	4.92 (125.0)	.27 (6.9)	4.52 (114.8)	9.8 (4.4)
2	3 x 3 Horiz.	A	3	#10	7.13 (181.1)	7.25 (184.2)	5.38 (136.7)	6.75 (171.5)	5.69 (144.5)	3.56 (90.4)	.25 (6.4)	2.31 (58.7)	.77 (19.6)	4.97 (126.2)	.27 (6.9)	—	10.8 (4.9)
	3 x 3 Vert.	B	3	#10	3.33 (84.6)	12.38 (314.5)	5.38 (136.7)	11.88 (301.8)	1.88 (47.8)	1.66 (42.2)	.25 (6.4)	.39 (9.9)	.77 (19.6)	4.97 (126.2)	.27 (6.9)	4.52 (114.8)	12.2 (5.5)
3, 4	3 x 3 Horiz.	A	3	1/4 in.	9.75 (247.7)	10.13 (257.3)	7.25 (184.2)	9.25 (235.0)	8.00 (203.2)	4.88 (124.0)	.44 (11.2)	3.11 (79.0)	.80 (20.3)	6.86 (174.2)	.27 (6.9)	—	26.0 (11.8)
	3 x 3 Vert.	B	3	1/4 in.	4.63 (117.6)	19.81 (503.2)	7.25 (184.2)	18.94 (481.1)	2.88 (73.2)	2.94 (74.7)	.44 (11.2)	.55 (14.0)	.80 (20.3)	6.86 (174.2)	.27 (6.9)	7.91 (200.9)	28.0 (12.7)
5	3 x 3 Horiz.	—	4	3/8 in.	35.25 (895.4)	25.50 (647.7)	8.75 (222.3)	—	—	—	—	—	—	—	—	—	73.0 (33.1)
6	3 x 3 Horiz.	—	4	3/8 in.	35.25 (895.4)	25.50 (647.7)	10.50 (266.7)	—	—	—	—	—	—	—	—	—	127.0 (57.7)
7	①																
8	①																
9	①																

① Refer to factory.

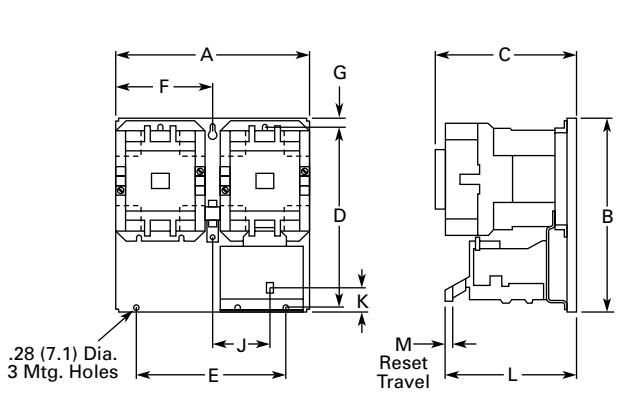


Figure A
Sizes 00 – 4 Horizontal

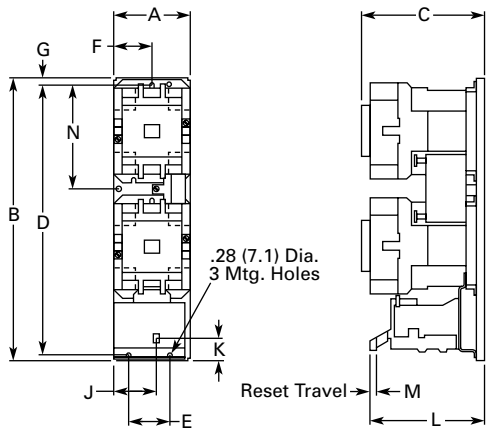


Figure B
Sizes 00 – 4 Vertical

Figure 33-50. Open Reversing Starters Dimensions

Not to be used for construction purposes unless approved.

Table 33-190. Open Multi-Speed Starters Dimensions

NEMA Size	Number of Poles	Fig.	Mounting Screws		Dimensions in Inches (mm)														Weight, Lbs. (kg)
			No.	Size	A	B	C	D	E	F	G	J	K	L	M	N	P	R	
00, 0, 1	3 x 3 Horiz.	A	3	#10	7.13 (181.1)	6.50 (165.1)	5.05 (128.3)	6.00 (152.4)	5.69 (144.5)	3.56 (90.4)	.25 (6.4)	2.30 (58.4)	.33 (8.4)	4.92 (125.0)	.27 (6.9)	3.81 (96.8)	—	2.91 (73.9)	10.0 (4.5)
	5 x 3 Horiz.	B	3	#10	8.00 (203.2)	6.50 (165.1)	5.05 (128.3)	6.00 (152.4)	6.53 (165.9)	3.56 (90.4)	.25 (6.4)	2.30 (58.4)	.48 (12.2)	4.92 (125.0)	.27 (6.9)	4.66 (118.4)	—	2.91 (73.9)	11.0 (5.0)
2	3 x 3 Horiz.	A	3	#10	7.13 (181.1)	7.25 (184.2)	5.38 (136.7)	6.75 (171.5)	5.69 (144.5)	3.56 (90.4)	.25 (6.4)	2.69 (68.3)	.69 (17.5)	4.97 (126.2)	.27 (6.9)	3.81 (96.8)	—	2.91 (73.9)	11.0 (5.0)
	5 x 3 Horiz.	B	3	#10	8.88 (225.6)	7.25 (184.2)	5.38 (136.7)	6.75 (171.5)	6.56 (166.6)	3.56 (90.4)	.25 (6.4)	2.69 (68.3)	.69 (17.5)	4.97 (126.2)	.27 (6.9)	4.66 (118.4)	—	2.84 (72.1)	13.0 (5.9)
3, 4	3 x 3 Horiz.	A	3	1/4 in.	9.75 (247.7)	10.13 (257.3)	7.25 (184.2)	9.25 (235.0)	8.00 (203.2)	4.88 (124.0)	.44 (11.2)	3.11 (79.0)	.80 (20.3)	6.86 (174.2)	.27 (6.9)	5.13 (130.3)	—	4.00 (101.6)	28.0 (12.7)
	5 x 3 Horiz.	B	3	1/4 in.	12.38 (314.5)	10.13 (257.3)	7.25 (184.2)	9.25 (235.0)	9.31 (236.5)	4.88 (124.0)	.44 (11.2)	3.11 (79.0)	.80 (20.3)	6.86 (174.2)	.27 (6.9)	6.44 (163.6)	—	4.00 (101.6)	33.5 (15.2)
5	①																		
6	①																		

① Refer to factory.

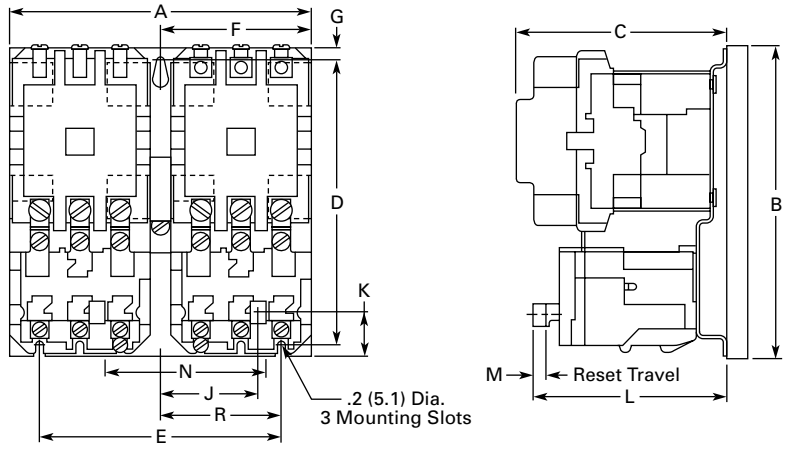


Figure A, Sizes 00 – 4

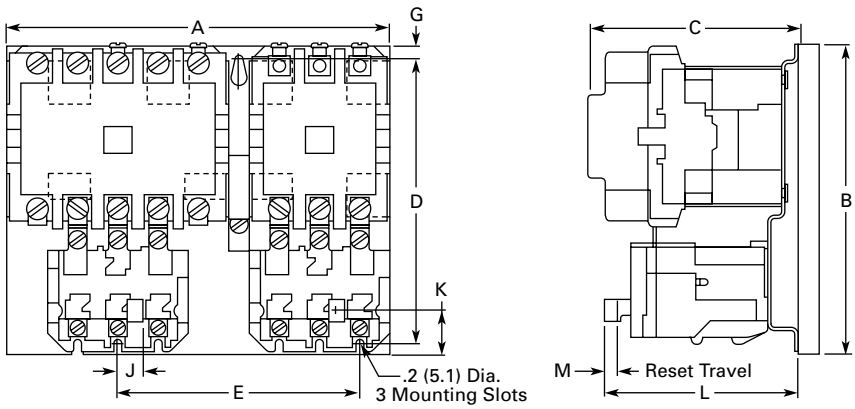


Figure B, Size 2

Note: 3-Pole x 3-Pole Devices Are for Wye-Wye Two-Winding Motors Only

Figure 33-51. Open Multi-Speed Starters Dimensions

Size 3 Starter

Product Selection — Non-reversing, Sizes 00 – 9

When Ordering Specify

Order by Catalog Number from **Table 33-191**, plus Suffix for coil voltages, verifying usage of appropriate sizes.

Heaters

Enter heaters as separate item by listing Catalog Number from tables, **Pages 33-148 – 33-149**, as required per starter.

Table 33-191. Non-reversing Starters Selection

Size	Amps	Max. UL Horsepower						2 Poles ③		3 Poles	
		1-Phase		3-Phase				Open Catalog Number ①	Price U.S $	Open Catalog Number ①	Price U.S. $
		115V	230V	208V	240V	480V	600V				
Sizes 00 – 6											
00	9	1/3	—	1-1/2	1-1/2	2	2	**A200MABR**	193.	**A200MAC_**	193.
0	18	1	—	3	3	5	5	**A200M0BR**	217.	**A200M0C_**	242.
1	27	2	—	7-1/2	7-1/2	10	10	**A200M1BR**	279.	**A200M1C_**	279.
1-1/2	36	3	—	—	—	—	—	**A200MDBR**	330.	**—**	—
2	45	7-12	—	10	15	25	25	**A200M2BR**	505.	**A200M2C_**	505.
3	90	—	—	25	30	50	50	**—**	—	**A200M3C_**	820.
4	135	—	—	40	50	100	100	**—**	—	**A200M4C_**	1,870.
5	270	—	—	75	100	200	200	**—**	—	**A200M5C_**	4,565.
6	540	—	—	150	200	400	400	**—**	—	**A200M6C_**	10,840.
Sizes 7 – 9											
7 ②	810	—	—	200	300	600	600	**—**	—	**A200M7C_**	16,100.
8 ②	1215	—	—	400	450	900	900	**—**	—	**A200M8C_**	24,100.
9 ②	2250	—	—	—	800	1600	—	**—**	—	**A200M9C_** ④	38,900.

① For ambient compensated overload relay with auto-reset, add Suffix **D**.
② Sizes 7 – 9 use rectifier with DC coil.
③ Single-phase with one single-pole overload relay.
④ For Size 9, only available coil voltage is 120V.

Table 33-192. Coils for Sizes 00 – 6

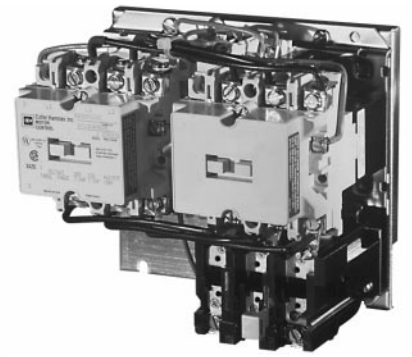
Coil Volts and Hz	Code Suffix
120/60 or 110/50	**AC**
200 – 208/60	**B**
240/60	**W**
480/60	**X**
600/60	**E**

Table 33-193. Coils for Sizes 7, 8 and 9 ⑤

Coil Volts and Hz	Code Suffix
110 – 120/50 or 60	**J**
220 – 240/50 or 60	**W**
440 – 480/50 or 60	**X**
600/60	**E**

⑤ For Size 9, only available coil voltage is 120V.

Factory Modifications. . . . . **Page 33-133**
Modification Kits, Accessories . . . . . **Pages 33-133 – 33-135**
Dimensions . . . . . **Page 33-123**
Discount Symbol **1CD1**



Size 1 Horizontal Reversing Starter

Product Selection — Reversing, Sizes 00 – 9

When Ordering Specify

Order by Catalog Number from **Table 33-194**, plus Suffix for coil voltages, verifying usage of appropriate sizes.

Heaters

Enter heaters as separate item by listing Catalog Number from tables, **Pages 33-148 – 33-149**, as required per starter.

Table 33-194. Reversing Starters Selection

Size	Amps	Max. UL Horsepower						Horizontal Design		Vertical Design	
		1-Phase		3-Phase				Catalog Number ①	Price U.S $	Catalog Number ①	Price U.S. $
		115V	230V	208V	240V	480V	600V				
Sizes 00 – 6											
00	9	1/3	1	1-1/2	1-1/2	2	2	**A210MAC_**	462.	**A250MAC_**	462.
0	18	1	2	3	3	5	5	**A210M0C_**	550.	**A250M0C_**	550.
1	27	2	3	7-1/2	7-1/2	10	10	**A210M1C_**	625.	**A250M1C_**	625.
2	45	3	7-1/2	10	15	25	25	**A210M2C_**	1,180.	**A250M2C_**	1,180.
3	90	—	—	25	30	50	50	**A210M3C_**	1,950.	**A250M3C_**	1,950.
4	135	—	—	40	50	100	100	**A210M4C_**	4,755.	**A250M4C_**	4,755.
5	270	—	—	75	100	200	200	**A210M5C_**	9,275.	**A250M5C_**	9,275.
6	540	—	—	150	200	400	400	**A210M6C_**	21,700.	**A250M6C_**	21,700.
Sizes 7 – 9											
7 ②	810	—	—	200	300	600	600	**—**	—	**A250M7C_**	31,250.
8 ②	1215	—	—	400	450	900	900	**—**	—	**A250M8C_**	46,250.
9 ②	2250	—	—	—	800	1600	—	**—**	—	**A250M9C_** ③	73,500.

① For ambient compensated overload relay with auto-reset, add Suffix **D.**
② Sizes 7 – 9 use rectifier with DC coil.
③ For Size 9, only available coil voltage is 120V.

Table 33-195. Coils for Sizes 00 – 6

Coil Volts and Hz	Code Suffix
120/60 or 110/50	**AC**
200 – 208/60	**B**
240/60	**W**
480/60	**X**
600/60	**E**

Table 33-196. Coils for Sizes 7, 8 and 9 ④

Coil Volts and Hz	Code Suffix
110 – 120/50 or 60	**J**
220 – 240/50 or 60	**W**
440 – 480/50 or 60	**X**
600/60	**E**

④ For Size 9, only available coil voltage is 120V.

Technical Data..... **Pages 33-129 – 33-132**
Heaters ..... **Pages 33-148 – 33-149**
Other Coil Voltages..... **Page 33-132**
Factory Modifications .... **Page 33-133**
Modification Kits, Accessories..... **Pages 33-133 – 33-135**
Dimensions..... **Page 33-124**
Discount Symbol..... **1CD1**

Product Selection

For Separate Two-Winding Motors

Heaters

33

Enter heaters as separate item by listing Catalog Number from table, **Pages 33-148 – 33-149**, as required per starter.

Table 33-197. Three-Phase, Non-reversing, Reversing 60 Hz Starters — Heater Selection

NEMA	Amps	Constant Horsepower				Constant or Variable Torque				3 Poles	
		208V	240V	480V	600V	208V	240V	480V	600V	Open Catalog Number ①	Price U.S. $
Sizes 0 – 6											
0	18	3	3	5	5	2	2	3	3	**A960M0C_**	755.
1	27	7-1/2	7-1/2	10	10	5	5	7-1/2	7-1/2	**A960M1C_**	845.
2	45	10	15	25	25	7-1/2	10	20	20	**A960M2C_**	1,465.
3	90	25	30	50	50	20	25	40	40	**A960M3C_**	2,277.
4	135	40	50	100	100	30	40	75	75	**A960M4C_**	5,698.
5	270	75	100	200	200	60	75	150	150	**A960M5C_**	13,550.
6	540	150	200	400	400	100	150	300	300	**A960M6C_**	23,500.

① For ambient compensated overload relay with auto-reset, add Suffix **D**.

For Single-Winding Motors

Table 33-198. Product Selection — Sizes 0 – 6

NEMA	Amps	208V	240V	480V	600V	3-Poles	
						Open Catalog Number ②	Price U.S. $
Constant Horsepower							
0	18	3	3	5	5	**A970M0C_**	1,070.
1	27	7-1/2	7-1/2	10	10	**A970M1C_**	1,145.
2	45	10	15	25	25	**A970M2C_**	2,020.
3	90	25	30	50	50	**A970M3C_**	3,045.
4	135	40	50	100	100	**A970M4C_**	7,870.
5	270	75	100	200	200	**A970M5C_**	15,660.
6	540	150	200	400	400	**A970M6C_**	35,010.
Constant or Variable Torque							
0	18	2	2	3	3	**A980M0C_**	1,070.
1	27	5	5	7-1/2	7-1/2	**A980M1C_**	1,145.
2	45	7-1/2	10	20	20	**A980M2C_**	2,020.
3	90	20	25	40	40	**A980M3C_**	3,045.
4	135	30	40	75	75	**A980M4C_**	7,870.
5	270	60	75	150	150	**A980M5C_**	15,660.
6	540	100	150	300	300	**A980M6C_**	35,010.

② For ambient compensated overload relay with auto-reset, add Suffix **D**.

Table 33-199. Coils for Sizes 0 – 6

Coil Volts and Hz	Coil Suffix
120/60 or 110/50	**AC**
200 – 208/60	**B**
240/60	**W**
480/60	**X**
600/60	**E**

Table 33-200. Coils for Sizes 0 – 6

Coil Volts and Hz	Coil Suffix
120/60 or 110/50	**AC**
200 – 208/60	**B**
240/60	**W**
480/60	**X**
600/60	**E**

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Heaters . . . . . **Pages 33-148 – 33-149**
Dimensions . . . . . **Page 33-125**
Discount Symbol **1CD1**

Electrical Characteristics

Table 33-201. Electrical Characteristics — Sizes 00 – 4

	Size 00	Size 0	Size 1	Size 2	Size 3	Size 4
Max. Voltage Rating	600V	600V	600V	600V	600V	600V
Ampere Rating						
(Open)	10A	20A	30A	50A	100A	150A
(Enclosed)	9A	18A	27A	45A	90A	135A
Squirrel Cage Motor						
Maximum Horsepower At:						
200V/60 Hz	1-1/2 hp	3 hp	7-1/2 hp	10 hp	25 hp	40 hp
230V/ 60 Hz	1-1/2 hp	3 hp	7-1/2 hp	15 hp	30 hp	50 hp
380V/50 Hz	1-1/2 hp	5 hp	10 hp	25 hp	50 hp	75 hp
460V – 575V/ 60 Hz	2 hp	5 hp	10 hp	25 hp	50 hp	100 hp
Resistive Heating kW ①						
Single-Phase, 2-Pole						
120V	—	—	3 kW	5 kW	10 kW	15 kW
240V	—	—	6 kW	10 kW	20 kW	30 kW
480V	—	—	12 kW	20 kW	40 kW	60 kW
600V	—	—	15 kW	25 kW	50 kW	75 kW
Three-Phase, 3-Pole						
120V	—	—	5 kW	8.5 kW	17 kW	26 kW
240V	—	—	10 kW	17 kW	34 kW	68 kW
480V	—	—	20 kW	34 kW	68 kW	105 kW
600V	—	—	25 kW	43 kW	86 kW	130 kW
Capacitor Switching kVAR, Three-Phase						
240V	—	—	—	12 kVAR	27 kVAR	40 kVAR
480V	—	—	—	25 kVAR	53 kVAR	80 kVAR
600V	—	—	—	31 kVAR	67 kVAR	100 kVAR
Transformer Switching kVA ②						
Single-Phase, 2-Pole						
120V	—	.6 kVA	1.2 kVA	2.1 kVA	4.1 kVA	6.8 kVA
240V	—	1.2 kVA	2.4 kVA	4.1 kVA	8.1 kVA	14 kVA
480V	—	2.4 kVA	4.9 kVA	8.3 kVA	16 kVA	27 kVA
600V	—	3 kVA	6.2 kVA	10 kVA	20 kVA	34 kVA
Three-Phase, 3-Pole						
120V	—	1.8 kVA	3.6 kVA	6.3 kVA	12 kVA	20 kVA
240V	—	2.1 kVA	4.3 kVA	7.2 kVA	14 kVA	23 kVA
480V	—	4.2 kVA	8.5 kVA	14 kVA	28 kVA	47 kVA
600V	—	5.2 kVA	11 kVA	18 kVA	35 kVA	59 kVA

① Resistive loads having inrush currents not exceeding 1.5 times continuous rating.

② These ratings are for transformers having inrush currents not more than 20 times peak of continuous current ratings. For inrush currents greater than 20 times, refer to factory.

Table 33-202. Electrical Characteristics — Sizes 5 – 9

	Size 5	Size 6	Size 7	Size 8	Size 9
Max. Voltage Rating	600V	600V	600V	600V	600V
Ampere Rating					
(Open)	300A	600A	900A	1350A	2500A
(Enclosed)	270A	540A	810A	1215A	2250A
Squirrel Cage Motor					
Maximum Horsepower At:					
200V/60 Hz	75 hp	150 hp	—	—	—
230V/60 Hz	100 hp	200 hp	300 hp	450 hp	800 hp
380V/50 Hz	150 hp	300 hp	—	—	—
460V – 575V/ 60 Hz	200 hp	400 hp	600 hp	900 hp	1600 hp
Resistive Heating kW ④					
Single-Phase, 2-Pole					
120V	30 kW	60 kW	90 kW	③	③
240V	60 kW	120 kW	180 kW	③	③
480V	120 kW	240 kW	360 kW	③	③
600V	150 kW	300 kW	450 kW	③	③
Three-Phase, 3-Pole					
120V	52 kW	105 kW	155 kW	③	③
240V	105 kW	210 kW	315 kW	③	③
480V	210 kW	415 kW	625 kW	③	③
600V	260 kW	515 kW	775 kW	③	③
Capacitor Switching kVAR, Three-Phase					
240V	80 kVAR	160 kVAR	240 kVAR	360 kVAR	665 kVAR
480V	160 kVAR	320 kVAR	480 kVAR	720 kVAR	1325 kVAR
600V	200 kVAR	400 kVAR	600 kVAR	900 kVAR	1670 kVAR
Transformer Switching kVA ⑤					
Single-Phase, 2-Pole					
120V	14 kVA	27 kVA	41 kVA	61 kVA	112 kVA
240V	27 kVA	54 kVA	81 kVA	122 kVA	225 kVA
480V	54 kVA	108 kVA	162 kVA	244 kVA	450 kVA
600V	68 kVA	135 kVA	203 kVA	304 kVA	562 kVA
Three-Phase, 3-Pole					
120V	41 kVA	81 kVA	122 kVA	182 kVA	337 kVA
240V	47 kVA	94 kVA	140 kVA	210 kVA	342 kVA
480V	94 kVA	188 kVA	280 kVA	420 kVA	783 kVA
600V	117 kVA	234 kVA	351 kVA	526 kVA	975 kVA

③ For ratings refer to factory.

④ Resistive loads having inrush currents not exceeding 1.5 times continuous rating.

⑤ These ratings are for transformers having inrush currents not more than 20 times peak of continuous current ratings. For inrush currents greater than 20 times, refer to factory.

Coil Characteristics

Table 33-203. DC Operated 120 and 240V Coils

Contactor Size	DC Contact Amp Rating 2 Poles in Series ⑥		AC Contact Amp Rating 120 or 240V
	120V	240V	
0	—	—	20
1	20	10	30
2	45	30	50
3	75	40	100
4	90	70	150

⑥ Non-inductive load.

Table 33-204. DC Magnetic Coil Data, 120 or 240V

Contactor Size	Watts	Operating Time in Milliseconds	
		Pick-Up	Drop-Out
0	18	25 to 75	16 to 25
1	18	25 to 75	16 to 25
2	18	25 to 75	16 to 25
3	35	25 to 75	16 to 25
4	35	25 to 75	16 to 25

Table 33-205. 380V, 50 Hz Starters — Maximum Horsepower Ratings

NEMA Size	00	0	1	2	3	4	5	6	7	8
Maximum Horsepower	1-1/2	5	10	25	50	75	150	300	450	700

Operating Coil Characteristics at Rated Coil Volts, Sizes 00 – 9

The following represent typical production test values and should not be interpreted as a guarantee of actual performance.

Table 33-206. Operating Coil Characteristics

	Sizes 00, 0, 1	Size 2	Size 3	Size 4 ①	Size 5	Size 6	Size 7	Size 8	Size 9
AC Coil									
Burden (Open VA)	160 VA	160 VA	625 VA	700 VA	1700 VA	2900 VA	②	②	②
(Closed VA)	25 VA	25 VA	50 VA	64 VA	180 VA	220 VA	②	②	②
(Closed Watts)	7.8 W	7.8 W	18 W	21 W	32 W	42 W	—	—	—
Pick-Up Volts ③	85%	85%	85%	85%	78%	70%	—	—	—
Drop-Out Volts ③	40 – 60%	40 – 60%	40 – 60%	40 – 60%	65 to 75%	60 to 70%	—	—	—
Pick-Up Time Hz ⑥⑦	1 – 1-1/2	1-1/2 – 2	2 – 2-1/2	1 – 1-1/2	1.5	4.0	—	—	—
Drop-Out Time Hz ⑥	3/4 – 1	3/4 – 1	3/4 – 1	3/4 – 1	.75	.75	—	—	—
DC Coil									
Burden (Open VA)	17 VA	17 VA	35 VA	—	600 VA	2120 VA	400 VA	400 VA	2100 VA
(Closed VA)	17 VA	17 VA	35 VA	—	22 VA	21 VA	400 VA	400 VA	350 VA
(Closed Watts)	18 W	18 W	35 W	35 W	20 W	20 W	400 W	400 W	350 W
Pick-Up Volts ③	80%	80%	80%	80%	64%	73%	45% – 65% ④	45% – 65% ④	50% – 65% ④
Drop-Out Volts ③	5 – 10%	5 – 10%	5 – 10%	5 – 10%	18%	13%	30% – 45% ④	30% – 45% ④	40% – 50% ④
Pick-Up Time Hz ⑦	—	25 – 75 mS	25 – 75 mS	25 – 75 mS	2.7 Hz ⑥	3 Hz ⑥	21 – 41 Hz ④⑥	17 – 29 Hz ④⑥	16 – 18 ④⑥
Drop-Out Time Hz ⑥	—	16 – 25 mS	16 – 25 mS	16 – 25 mS	9.3 Hz ⑥	17.5 Hz ⑥	7 – 12 Hz ⑤⑥	7 – 12 Hz ⑤⑥	18 – 20 Hz ④⑥

① Data pertains to Model K; for Model J, refer to factory.
② DC Operated only.
③ Percent of rated coil voltage.
④ Lower figure when coil is cold. Higher figure when coil is hot.
⑤ Drop-out time to clear arc. Time varies with type of load and contact wear.
⑥ At 60 Hz base.
⑦ To contact touch.

Mechanical Characteristics

NEMA Standard ICS 2-110

Direct-current operated contactors shall withstand 110% of their rated voltage continuously without injury to the operating coils and shall close successfully at 80% of their rated voltage.

Alternating-current operated contactors shall withstand 110% of their rated voltage continuously without injury to the operating coils and shall close successfully at 85% of their rated voltage.

Table 33-207. Mechanical Characteristics, Sizes 00 –9

	Sizes 00, 0, 1	Size 2	Size 3	Size 4	Size 5	Size 6	Size 7	Size 8	Size 9
Dimensions in Inches (mm)									
Height	6.45 (163.8)	7.16 (181.9)	9.93 (252.2)	9.93 (252.2)	12.00 (304.8) ①	13.50 (342.9) ①	18.62 (472.9) ①	19.25 (489) ①	25.00 (635) ①
Width	3.31 (84.1)	3.31 (84.1)	4.62 (117.3)	4.62 (117.3)	7.00 (177.8) ①	7.00 (177.8) ①	23.50 (596.9) ①	23.50 (596.9) ①	32.00 (812.8) ①
Depth	4.61 (117.1)	4.96 (126)	6.75 (171.5)	6.75 (171.5)	7.75 (196.9) ①	8.75 (222.3) ①	11.00 (279.4) ①	11.00 (279.4) ①	13.00 (330.2) ①
Panel Area — Square Inches	21.35	23.7	46.0	46.0	84.0	94.5	437.5	452.4	800
Weight — Pounds	3.5 Lbs.	3.5 Lbs.	11.5 Lbs.	11.5 Lbs.	25 Lbs.	42 Lbs.	215 Lbs.	265 Lbs.	315 Lbs.
Cable Connection	—	—	—	—	Front	Front	Front/Rear	Front/Rear	Front/Rear
Maximum Cable Size/Phase Copper (AWG/MCM)	6 AWG	3 AWG	1/0	4/0	1-500 MCM	2-500 MCM	3-500 MCM	4-500 MCM	8-500 MCM
Auxiliary Electrical Circuits Available	8	6	6	6	4	4	3	3	4
Latched Version Available	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
Mechanical Interlock Combinations Available									
Sizes 00, 0, 1, 2, 3, 4	Verti., Horiz.	Vert., Horiz.	Vert., Horiz.	Vert., Horiz.	Vert., Horiz.	—	—	—	—
5	—	—	—	—	Vert., Horiz.	Vert., Horiz.	—	—	—
6	—	—	—	—	Vert., Horiz.	Vert., Horiz.	Vertical	Vertical	—
7, 8	—	—	—	—	—	Vertical	Vertical	Vertical	Vertical
9	—	—	—	—	—	—	Vertical	Vertical	Vertical

① For Sizes 5 – 9 contactors only; for starter Sizes 5 – 9, refer to factory.

Table 33-208. Data from Tables 430 — 147 Through 150 of 1996 NEC: Motor Amperes at Full Load ②, Three-Phase AC

hp	Single-Phase AC		Induction Type Squirrel-Cage and Wound-Rotor Amperes				DC	
	115V	230V	200V	230V	460V	575V	120V	240V
1/6	4.4	2.2	—	—	—	—	—	—
1/4	5.8	2.9	—	—	—	—	3.1	1.6
1/3	7.2	3.6	—	—	—	—	4.1	2.0
1/2	9.8	4.9	2.5	2.2	1.1	.9	5.4	2.7
3/4	13.8	6.9	3.7	3.2	1.6	1.3	7.6	3.8
1	16	8	4.8	4.2	2.1	1.7	9.5	4.7
1-1/2	20	10	6.9	6.0	3.0	2.4	13.2	6.6
2	24	12	7.8	6.8	3.4	2.7	17	8.5
3	34	17	11.0	9.6	4.8	3.9	25	12.2
5	56	28	17.5	15.2	7.6	6.1	40	20
7-1/2	80	40	25.3	22	11	9	58	29
10	100	50	32.2	28	14	11	76	38
15	—	—	48.3	42	21	17	—	55
20	—	—	62.1	54	27	22	—	72
25	—	—	78.2	68	34	27	—	89

hp	Single-Phase AC		Induction Type Squirrel-Cage and Wound-Rotor Amperes				DC	
	115V	230V	200V	230V	460V	575V	120V	240V
30	—	—	92	80	40	32	—	106
40	—	—	120	104	52	41	—	140
50	—	—	150	130	65	52	—	173
60	—	—	177	154	77	62	—	206
75	—	—	221	192	96	77	—	255
100	—	—	285	248	124	99	—	341
125	—	—	359	312	156	125	—	425
150	—	—	414	360	180	144	—	506
200	—	—	552	480	240	192	—	675
250	—	—	—	—	302	242	—	—
300	—	—	—	—	361	289	—	—
350	—	—	—	—	414	336	—	—
400	—	—	—	—	477	382	—	—
450	—	—	—	—	515	412	—	—
500	—	—	—	—	590	472	—	—

② These current values are for motors running at usual speeds and with normal torque characteristics. Motors for special low speed or high torque may require higher current. In all cases, heaters should be selected on basis of information on motor nameplate or motor card data.

Combination Ratings

Table 33-209. Combination Ratings — Sizes 00 – 2

Short-Circuit Protective Device (SCPD)	Max. Rating SCPD	Circuit Breaker Interrupting Rating	Short-Circuit Withstand Capability	
			Current	Voltage
Sizes 00, 0, 1				
Class H Fuse	60A	—	5,000A	600V
Class J Fuse	60A	—	100,000A	600V
Class R Fuse	60A	—	100,000A	600V
Class T Fuse	60A	—	100,000A	600V
Magnetic Only ① Type CB ②	30A	Marked HMCP	100,000A	480V
			50,000A	600V
Thermal/Mag. Type CB ③	50A	65,000A	65,000A	480V
		25,000A	25,000A	600V
		100,000A	100,000A	480V
		35,000A	35,000A	600V
Magnetic Only Type CB + CL ④	30A	HMCP + Current Limiter	100,000A	600V
Thermal/Mag. Type CLB ⑤	50A	150,000A	100,000A	480V
Size 2				
Class H Fuse	100A	—	5,000A	600V
Class J Fuse	100A	—	100,000A	600V
Class R Fuse	100A	—	100,000A	600V
Class T Fuse	100A	—	100,000A	600V
Magnetic Only ① Type CB ②	50A	Marked HMCP	100,000A	480V
			50,000A	600V
Thermal/Mag. Type CB ③	90A	65,000A	65,000A	480V
		25,000A	25,000A	600V
		100,000A	100,000A	480V
		35,000A	35,000A	600V
Magnetic Only Type CB + CL ④	50A	HMCP + Current Limiter	100,000A	600V
Thermal/Mag. Type CLB ⑤	50A	150,000A	100,000A	480V

① Instantaneous Adjustable Trip.
② Circuit Breaker.
③ Inverse Time Circuit Breaker.
④ Instantaneous Adjustable Trip with Current Limiting Attachment.
⑤ Inverse Time with Built-In Current Limiting Attachment.

Table 33-210. Combination Ratings — Sizes 3 and 4

Short-Circuit Protective Device (SCPD)	Max. Rating SCPD	Circuit Breaker Interrupting Rating	Short-Circuit Withstand Capability	
			Current	Voltage
Size 3				
Class H Fuse	60A	—	5,000A	600V
Class J Fuse	60A	—	100,000A	600V
Class R Fuse	60A	—	100,000A	600V
Class T Fuse	60A	—	100,000A	600V
Magnetic Only ⑥ Type CB ⑦	100A	Marked HMCP	100,000A	480V
			50,000A	600V
Thermal/Mag. Type CB ⑧	150A	65,000A	65,000A	480V
		25,000A	25,000A	600V
		100,000A	100,000A	480V
		35,000A	35,000A	600V
Magnetic Only Type CB + CL ⑨	100A	HMCP + Current Limiter	100,000A	600V
Thermal/Mag. Type CLB ⑩	150A	50,000A	100,000A	480V
Size 4				
Class H Fuse	400A	—	10,000A	600V
Class J Fuse	400A	—	100,000A	600V
Class R Fuse	400A	—	100,000A	600V
Class T Fuse	400A	—	100,000A	600V
Magnetic Only ⑥ Type CB ⑦	150A	Marked HMCP	100,000A	480V
			50,000A	600V
Thermal/Mag. Type CB ⑧	250A	65,000A	65,000A	480V
		25,000A	25,000A	600V
		100,000A	100,000A	480V
		35,000A	35,000A	600V
Magnetic Only Type CB + CL ⑨	150A	HMCP + Current Limiter	100,000A	600V
Thermal/Mag. Type CB + CL ⑩	250A	200,000A	100,000A	600V
Thermal/Mag. Type CLB ⑪	250A	150,000A	100,000A	480V

⑥ Instantaneous Adjustable Trip.
⑦ Circuit Breaker.
⑧ Inverse Time Circuit Breaker.
⑨ Instantaneous Adjustable Trip with Current Limiting Attachment.
⑩ Inverse Time with Built-In Current Limiting Attachment.
⑪ Inverse Time Current Limiting Breaker.

Coil Suffix

Table 33-211. Other Available Coil Voltages — AC and DC Coils

Coils	Catalog Number Suffix	Coil Rating (Volts/Hertz)	Catalog Number Suffix	Coil Rating (Volts/Hertz)
AC	**A**	120/60, 110/50	**N**	110/50
	B	200-208/60	**P**	48/60
	C ⑫	240/60 and 480/60	**Q** ⑯	AC/DC Volts Specified
	D	440/50	**R** ⑫	120/60 and 240/60
	E	600/60 Hz	**U**	440-480/50 or 60 Rect. to DC
	G	220/50		
	H	380/50	**V**	110/60
	I	24/60	**W**	240/60
	J	110-120/50 or 60 Rect. to DC	**X**	480/60
			Y	415/50
	K	220-240/50 or 60 Rect. to DC	**Z**	277/60
DC ⑬⑭⑮	**L**	24V DC	**S**	125V DC
	M	48V DC	**T**	250V DC

⑫ List Price Addition for dual voltage coils. Consult Sales Office or Price List.
⑬ List Price Addition for DC coils. Consult Sales Office or Price List.
⑭ DC coils for Size 5 and 6 contactors and starters are intermittent duty rated only. A mechanical latch is required.
⑮ DC coils. Use only on contactors originally supplied with a DC coil.
⑯ For Q suffixes "order by description" consult Technical Support Center.

Table 33-212. Other DC Coils Available (For Q Suffix) ⑰

Voltages	Sizes 0 & 1	Size 2	Voltages	Sizes 0 & 1	Size 2
	1- to 4-Pole	1- to 3-Pole		1- to 4-Pole	1- to 3-Pole
	Style Number			Style Number	
12	1268C86G07		79	1268C86G08	
28	1268C86G06		96	1268C86G15	
32	1268C86G09		200	1268C86G11	
34	1268C86G16		300	1268C86G14	
37.5	1268C86G17		315	1268C86G12	
40	1268C86G13		125/250	1268C86G03	
50	1268C86G10		—		

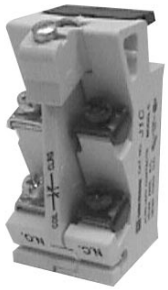
⑰ For Q suffixes "order by description" consult Technical Support Center.

Factory Modifications

Table 33-213. A200 Factory Modifications

Modifications	Description	Catalog Number Suffix	NEMA Size								
			00 – 1	2	3	4	5	6	7	8	9
			Adder U.S. $								
Control Circuit	1 Extra Auxiliary Contact (1NO-1NC) Non-reversing, Reversing, 2-Speed Unwired	**J1**	80. 160.	80. 160.	80. 160.	80. 160.	80. 160.	80. 160.	80. 160.	240. 480.	240. 480.
	2 Extra Auxiliary Contact Non-reversing, Reversing, 2-Speed Unwired	**J2**	60. 320.	60. 320.	60. 320.	60. 320.	60. 320.	60. 320.	60. 320.	480. 960.	480. 960.
	3 Extra Auxiliary Contact Non-reversing, Unwired	**J3**	240.	240.	240.	240.	—	—	—	—	—
	4 Extra Auxiliary Contact Non-reversing, Unwired	**J4**	320.	320.	320.	320.	—	—	—	—	—
	Wired for Separate Control (NC)	**C**	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C
	Omit Control Wiring (NC)	**X**	175.	175.	175.	175.	175.	175.	175.	175.	175.
Overload Relays (Substitutions)	Ambient Compensated with Auto Reset (NC)	**D**	N/C	N/C	N/C	N/C	N/C	N/C	—	—	—
	Fast Trip — Ambient Compensated (Specify Motor FLA)	**D7**	145.	145.	145.	145.	145.	145.	—	—	—
	Overload Relay Alarm Contact (NO) per overload	**E**	36.	36.	36.	36.	36.	36.	—	—	—

Accessories and Field Modification Kits



Type J Auxiliary Contact

Type J Auxiliary Contact

- Capable of being field mounted in a contactor or starter (Classes A200, A900 Sizes 00 – 6, V200, V201 vacuum and definite purpose controllers).
- Provides two separate electrical contact sets which wire vertically and are color coded; black designates NC and silver designates NO. Please note that the vertical wiring is contrary to the horizontal wiring of the L-56 auxiliary contacts.
- Designed to fit within dimensions of starter; no additional panel space is required.
- Provides circuit isolation (no polarity restrictions) and single break bifurcated contacts.

Table 33-214. Auxiliary Contact Ratings

Voltage	Make	Break
NEMA A600		
120 – 600V AC	7200 VA	720 VA
72 – 120V AC	60A	720 VA
28 – 72V AC	60 VA	10A
NEMA R300		
28 – 300V DC	28 VA	28 VA

Table 33-215. Auxiliary Contact Types

Contact Type	Max.	Catalog Number	Price U.S. $
1NO and 1NC	4	**J11**	58.
2NC	4	**J02**	58.
2NO	4	**J20**	58.
1 Coil Clearing NC and 1NO	4	**J1C**	58.

Discount Symbol **1CD1C**

SS-56 Surge Suppressor

SS-56 Surge Suppressor

- Designed to be used with magnetic motor controllers through Size 4 in 120V, 60 Hz control circuit applications where electronic equipment is used.
- Steady State Coil Volts: 120, 60 Hz, RMS
- Peak Input Volts: 169.6, 60 Hz, Max. Amplitude
- Max. Ambient Temperature: 65°C
- Nominal Limiting Volts: 270 Peak
- Nominal Rate of Volt Rise: .5 per mS

Table 33-216. Surge Suppressor ①

Type Mounting	Kit Catalog Number	Price U.S. $ ②
Starter	**SS-56**	65.50

① Can be used on Sizes 5 and 6 with 120V coil. Mounting bracket required — order separately. Mounting Bracket 177C043G04.

② Discount Symbol **1CD1**.

F-56 Fuse Block

- Facilitates installation of fuses (15A, 600V max.) in control circuits.
- Utilizes Bussman type KTK fuses, or equivalent.
- Mounts in same cavity as Type J auxiliary contact.
- No tools or mounting hardware needed.
- Fuse not included.

Table 33-217. Fuse Block

Mounting	Kit Catalog Number	Price U.S. $
Starter	**F56**	28.75
Panel	**F56-P**	28.75

R-56 Interposing Relay

The R-56AA interposing relay is a low energy solid-state device with a single NO solid-state contact. It can be used as a 120V AC control relay, and will operate on as little as 40V AC input. Is useful in applications requiring long control wiring runs where excessive voltage drop would prevent the contactor or relay from energizing. Will operate a Size 4 contactor from 10,000 feet using 18 AWG wire.

Table 33-218. Interposing Relay

Type Mounting	Kit Catalog Number	Price U.S. $ ③
Starter or Panel	**R56-AA**	415.00

③ Discount Symbol **1CD1**.

Mechanical Interlock

- Prevents closing of one member of a reversing or multi-speed contactor until the opposite member is completely open.
- Lever type mechanism assures positive action.
- Can be factory assembled or field mounted on A200 and A900 starters and contactors.

Table 33-219. Mechanical Interlock

Contactor Arrangement (Number of Poles, Horizontal or Vertical)	Interlock Catalog Number	Continuous Size	Price U.S. $
3 x 3 Horizontal	**M-33-1B**	0, 1	42.75
4 x 4 Horizontal	**M-33-1B**	0, 1	42.75
5 x 3 Horizontal	**M-33-1B**	0, 1	42.75
All Pole Combination, Vertical	**M-34-1A**	0, 1	42.75
3 x 3 Horizontal Reversing	**M-33-2B**	2	42.75
3 x 3 Vertical Reversing	**M-34-2A**	2	42.75
5 x 3 Horizontal	**M-35-2A**	2	42.75
4 x 4 Horizontal	**M-36-2A**	2	42.75
All Pole Combination Horizontal	**M-33-3B**	3, 4	71.50
All Pole Combination Vertical	**M-34-3**	3, 4	71.50

B3NO Bell Alarm Contact

- Isolated Normally Open Bell Alarm Contact.
- Mounts in Type B block-type overload relay.

Table 33-220. Bell Alarm Contact

Kit Catalog Number	Price U.S. $
B3NO-2	21.40
B3NO-4 for Size 3 and 4	21.40

Table 33-221. Control Contact Ratings (B600)

AC Volts	Maximum Amperes	
	Make	Break
24 – 120	30	3.00
121 – 600	3600 VA	360 VA
Continuous Current Rating: 5A		

Overload Relay Reset Extension

- Used to adjust overload reset rod depth of Class A200 Model J starters and current design overload relays to same dimensions as obsolete B200 starters and overloads identified by suffix **B**, i.e., BA13**B**.

When replacing obsolete B200 device with Class A200 starter and Type B overload, order Style 6710C11H03. No charge.

When replacing obsolete B200 device with Class A200 starter and Type A overload, order Style 1490C15H10. No charge.

Power Pole Kit

- Adds 1NO or 1NC power pole to Size 00 – 1 A201 Class contactors.
- Factory installed or field mountable in load side auxiliary cavities.
- 600V AC.
- Continuous current rating of 18A for Size 0, 27A for Size 1.

Table 33-222. Power Pole Kit ④

Continuous Current Rating	Kit Size	Kit Catalog Number	Price U.S. $
Normally Open			
18	0	**PN0-0**	79.00
27	1	**PN0-1**	107.00
Normally Closed			
18	0	**PNC-0**	79.00
27	1	**PNC-1**	107.00

④ Do not use with DC operated contactors.

Discount Symbol **1CD1C**

Replacement Auxiliary Contacts

Table 33-223. Replacement Auxiliary Contacts

Contactor Size	Contact Arrangement	Aux. Elect. Contact		Price U.S. $
		Catalog Number	Style Number	
5, 6	1NO + 1NC	**J11**	**9084A17G01**	58.
	2NO	**J20**	**9084A17G02**	58.
	2NC	**J02**	**9084A17G03**	58.
7, 8	1NO	—	**578D461G01**	171.
	1NC	—	**578D461G03**	182.
9	1NO + 1NC	—	**843D943G04**	161.
	2NO	—	**843D943G05**	161.
	2NC	—	**843D943G06**	161.

Extra Auxiliary Contact Kits

All starters include an auxiliary contact with 1NO and 1NC contact. These kits include an auxiliary contact with contacts as shown, plus operating arm and mounting bracket when required.

Table 33-224. Extra Auxiliary Contact Kits

Contactor Size	Contact Arrangement	Style Number	Price U.S. $
5, 6	1NO + 1NC	**3463D94G18**	86.
	2NO	**3463D94G04**	86.
	2NC	**3463D94G19**	86.
7, 8 ①	2NO	**818D498G06**	453.
	1NO	**818D498G04**	224.

① Size 7 and larger use DC coils as standard.

DC Coil Conversion Kits

Kits listed below include all necessary parts to convert from AC to DC control including the DC coil with built-in diode, rectifier, auxiliary interlock and all mounting hardware.

Table 33-225. DC Coil Conversion Kits

Size	Voltage	Kit Style Number	Price U.S. $
5	110-120	**7864A28G01**	461.
	220-240	**7864A28G02**	515.
	440-480	**7864A28G03**	515.
6	110-120	**7864A29G01**	515.
	220-240	**7864A29G02**	570.
	440-480	**7864A29G03**	570.

Mechanical Interlocks

Table 33-226. Mechanical Interlocks

Contactor Sizes	Style Numbers		Price U.S. $
	Horizontal	Vertical	
3, 4 and 5	**2050A11G75**	**2050A11G65**	349.
5 and 5	**2050A11G25**	**2050A11G15**	349.
5 and 6	**2050A11G27**	**2050A11G17**	349.
6 and 6	**2050A11G26**	**2050A11G16**	349.
6 and 7, 8	—	**2050A11G55**	349.
7, 8 and 7, 8	No (Rear Conn.)	**567D624G01**	534.
7, 8 and 7, 8	No (Front Conn.)	**567D624G03**	534.
7, 8 and 9	No (Rear Conn.)	**9944D56G06**	534.
9 and 9	No (Rear Conn.)	**9944D56G01**	534.

Overload Protection

Overload Protection Size 5 Starters

Type B overload relay is a three-pole, block type, thermal ambient compensated device with manual reset mounted integrally. Current transformers are enclosed in a protective case and integrally mounted to save panel space. Standard ratio is 300:5.

Overload Protection Size 6 Starters

Overload protection assembly consists of three current transformers, Type B three-pole block overload relay and an optional interposing relay. These parts are mounted on a panel which connects directly to the load terminal of the contactor. Current transformers are 600:5 ratio as standard.

If automatic reset is required, the Type A, three-pole block, ambient compensated relay is available upon request.

Overload Relay Kits

Each kit includes three current transformers (standard ratio) and one Type B, three-pole block overload relay, ambient compensated with manual reset.

Table 33-227. Overload Relay Kits

Kit Size	Kit Part Number	Price U.S. $
5	**2057A34G01**	500.
6	**6379D80G10**	675.

Table 33-228. Replacement Terminal Lugs ②

Contactor Size	Cable Size	Kit Style Number	Price U.S. $	Terminals	
				Qty. in Kit	Qty. Req'd. per Pole
5	1-500 MCM	**2119A76G01**	73.	6	2
6	2-500 MCM	**7858A96G01**	172.	6	2
7	4-500 MCM	**7858A96G02**	343.	12	4
8	4-500 MCM	**7858A96G03**	343.	12	4

② All mounting hardware is included in kit.

Discount Symbol **1CD1C**

When Ordering Specify

Use this renewal parts data to identify device by style number, catalog number and/or description.

Select style number of replacement part from the following pages.

For clarification of ordering procedure, pricing and discounts, contact the Customer Support Center.

General Information

This renewal parts data will provide the proper identification of standard parts which may be required for maintenance of Cutler-Hammer components.

It is the intent of this catalog section to make it possible to quickly select the parts needed.

An investment in renewal parts and regular maintenance program will protect against downtime and ensure a proper duty cycle for your equipment.

To maintain maximum operating efficiency and dependability of your equipment, only genuine Cutler-Hammer replacement parts should be used.

This section identifies the replacements parts which are available. Order by style number.

JF Autostarters

Table 33-229. JF Autostarter Kits

Frame Size	Start Contacts			Run Contacts			Grid Stack Kit		
	Required	Style Number	Price U.S. $	Required	Style Number	Price U.S. $	Required	Style Number	Price U.S. $
2 – 3	1	**38A7018G12**	242.	1	**38A7018G13**	790.	1	**3354D90G10**	238.
4 – 5 5L	1	**550D409G18**	395.	1	**550D409G19**	2,460.	1	**3354D90G10**	238.
5M – 5MM	1	**3354D90G08**	1,610.	1	**3354D90G09**	2,930.	2	**3354D90G10**	238.

Note: Kits contain a complete set of moving contacts, stationary contacts and springs.

Table 33-230. Solenoid Assembly with Coil (All Sizes) ①

Volt	Hz	Style Number ②	Price U.S. $
115	60	**5264C05H01**	575.
230	60	**5264C05H02**	575.
460	60	**5264C05H03**	575.
575	60	**5264C05H04**	575.

① When replacing solenoid assembly series 416C160 use adapter plate style 9917D02H01 — 1 required.

② These styles replace coil style 296B892G__. When ordering new style as replacement, customer must order adapter plate 9917D02H01, Quantity 1 required.

Discount Symbol **1CD1C**

AC Starters, Contactors A200, A201

Table 33-231. AC Contactors Model J Sizes 00, 0, 1, 2 Kits ①

Part	Poles	Size 00		Size 0		Size 1		Size 2	
		Style Number	Price U.S. $	Style Number	Price U.S. $	Style Number	Price U.S. $	Style Number	Price U.S. $
Contact Kit	2	**373B331G17**	47.75	**373B331G02**	58.50	**373B331G07**	68.50	**373B331G11**	122.00
	3	**373B331G18**	70.50	**373B331G04**	87.50	**373B331G09**	102.00	**373B331G12**	182.00
	4	**373B331G18**	70.50	**373B331G04**	87.50	**373B331G09**	102.00	**373B331G13**	182.00
	5	**373B331G19**	118.00	**373B331G05**	146.00	**373B331G10**	170.00	③	
Arc Box ②	2, 3, 4	**6714C74G01**	22.40	**6714C74G02**	22.40	**6714C74G03**	22.40	**6714C74G07** (2-, 3-pole)	40.50
	5	**6714C74G04**	22.40	**6714C74G05**	22.40	**6714C74G06**	22.40	**6714C74G08** (4-, 5-pole)	65.00
Cross Bar	2, 3	**N/A**	—	**N/A**	—	**N/A**	—	**672B788G32**	50.50
	4, 5	**N/A**	—	**N/A**	—	**N/A**	—	**672B788G34**	77.50
Upper Base (for single rated coils only)	2, 3	**N/A**	—	**N/A**	—	**N/A**	—	**672B788G33**	83.50
	4, 5	**N/A**	—	**N/A**	—	**N/A**	—	**672B788G35**	101.00
Lower Base	2, 3	**N/A**	—	**N/A**	—	**N/A**	—	**1250C33G09**	61.00
	4, 5	**N/A**	—	**N/A**	—	**N/A**	—	**1250C33G05**	120.00
KO Spring (Pk of 10)	All	**N/A**	—	**N/A**	—	**N/A**	—	**503C796G01**	50.50
Terminal Line/Load (Pk of 3)	All	**N/A**	—	**N/A**	—	**N/A**	—	**371B870G03**	42.50

① Model C contact tips and coils 00-4, 2-, 3-, 4- and 5-pole contactors are same as Model J. All other parts are unavailable.
② Mounting hardware included.
③ Use one each of 373B331G11 and 373B331G12.

Table 33-232. AC Coils

Voltage	Hz	Size 00, 0, 1				Size 2			
		2-, 3-, 4-Pole		5-Pole		2-, 3-Pole		4-, 5-Pole	
		Style Number	Price U.S. $	Style Number	Price U.S. $	Style Number	Price U.S. $	Style Number	Price U.S. $
120/110	60/50	**505C806G01**	61.00	**505C808G01**	79.00	**505C806G01**	61.00	**505C818G01**	79.00
208	60	**505C806G02**	61.00	**505C808G02**	79.00	**505C806G02**	61.00	**505C818G02**	79.00
600/550	60/50	**505C806G05**	61.00	**505C808G05**	79.00	**505C806G05**	61.00	**505C818G05**	79.00
380	50	**505C806G07**	61.00	**505C808G07**	79.00	**505C806G07**	61.00	**505C818G07**	79.00
240/220	60/50	**505C806G12**	61.00	**505C808G12**	79.00	**505C806G12**	61.00	**505C818G12**	79.00
480/440	60/50	**505C806G13**	61.00	**505C808G13**	79.00	**505C806G13**	61.00	**505C818G13**	79.00
24	60	**505C806G16**	61.00	**N/A**	79.00	**505C806G16**	61.00	**505C818G15**	79.00
277	60	**505C806G18**	61.00	**505C808G16**	79.00	**505C806G18**	61.00	**505C818G16**	79.00
240/480 ④	60/60	**505C806G03**	79.00	**505C808G03**	79.00	**505C806G03**	79.00	**505C818G03**	79.00
120/240 ⑤	60/60	**505C806G10**	79.00	**505C808G10**	79.00	**505C806G10**	79.00	**505C818G10**	79.00

④ Dual Voltage Coils. Use only on contactors or starters originally supplied with a dual voltage coil.
⑤ Use only on contactors originally supplied with a DC coil.

Table 33-233. DC Coil ⑦

Voltage	Size 0, 1	Size 2	Price U.S. $
	1, 2, 3, 4 Pole	1, 2, 3 Pole	
	Style Number		
12	**1268C86G07**		122.00
24	**1268C86G04**		122.00
48	**1268C86G05**		122.00
125	**1268C86G02**		122.00
250	**1268C86G01**		122.00
125/250 ⑥	**1268C86G03**		122.00

⑥ Dual Voltage Coils. Use only on contactors or starters originally supplied with a dual voltage coil.
⑦ Use only on contactors originally supplied with a DC coil.

Accessories for Size 5 – 9 AC Contactors

Note: A rectifier circuit converts the AC supply to DC supply. This conversion provides pick up and drop out characteristics. All necessary parts are included in the kit.

Table 33-234. AC-DC Coil Conversion Kits

Voltage	Size 5		Size 6	
	Style Number	Price U.S. $	Style Number	Price U.S. $
120V AC	**7864A28G01**	515.00	**7864A29G01**	570.00
240V AC	**7864A28G02**	515.00	**7864A29G02**	570.00
480V AC	**7864A28G03**	515.00	**7864A29G03**	570.00

Table 33-235. Replacement Coils for Above

Voltage	Size 5		Size 6	
	Style Number	Price U.S. $	Style Number	Price U.S. $
120V AC	**7856A15G05**	312.00	**7856A16G05**	312.00
240V AC	**7856A15G10**	331.00	**7856A16G10**	331.00
480V AC	**7856A15G15**	312.00	**7856A16G15**	331.00

Discount Symbol **1CD1C**

AC Starters, Contactors A200, A201 (Continued)

Accessories for Size 5 – 9 AC Contactors

Table 33-236. Auxiliary Electrical Interlocks Size 7 – 9 AC and All DC Units

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Type	Circuits	Application	Style Number	Price U.S. $
L63	NO	Size 7 – 8	**578D461G01**	171.00
L63	NC	Size 7 – 8	**578D461G03**	182.00
L64	NO-NC	Size 9	**843D943G04**	152.00
L64	2NO	Size 9	**843D943G05**	152.00
L64	2NC	Size 9	**843D943G06**	152.00

Accessories for Size 00 – 6 AC Contactors

Table 33-237. Auxiliary Electrical Interlocks

Catalog Number (Obsolete)	Style Number (Obsolete)	Circuits	Catalog Number Current	Style Number Current	Price U.S. $
(L-56)	(2609D01G01)	1NO & 1NC	**J11**	**9084A17G01**	58.00
(L-56D)	(2609D01G02)	2NO	**J20**	**9084A17G02**	58.00
(L-56E)	(2609D01G03)	1NO & 1NC	**J11**	**9084A17G01**	58.00
(L-56B)	(2609D01G04)	2NO	**J20**	**9084A17G02**	58.00
(L-56H)	(2609D01G05)	2NO	**J20**	**9084A17G02**	58.00
(L-56J)	(2609D01G06)	1NO & 1NC DB	**J1C**	**9084A17G04**	58.00
(L-56A)	(2609D01G07)	N/A	**N/A**	**N/A**	—
(L-56B)	(2609D01G08)	N/A	**N/A**	**N/A**	—
(L-56F)	(2609D01G09)	N/A	**N/A**	**N/A**	—
(L-56G)	(2609D01G10)	1NO & 1NC DB	**J1C**	**9084A17G04**	58.00
(L-56C)	(2609D01G11)	2NC	**J02**	**9084A17G03**	58.00
(L-56M)	(2609D01G12)	N/A	**N/A**	**N/A**	—
(L-56P)	(2609D01G17)	1NO & 1NC	**J11**	**9084A17G01**	58.00
(L-56R)	(2609D01G18)	2NC	**J02**	**9084A17G03**	58.00
(L-56S)	(2609D01G19)	1NO & 1NC	**J11**	**9084A17G01**	58.00

Model J – K, Sizes 3 and 4

Table 33-238. Model J – K Series 3, 4 Kits ①

Part	Poles	Size 3 – Model J		Size 4 – Model J ③		Size 4 – Model K ②	
		Style Number	Price U.S. $	Style Number	Price U.S. $	Style Number	Price U.S. $
Contact Kit	2	**626B187G12**	199.00	**626B187G16**	417.00	**5250C81G16**	417.00
	3	**626B187G13**	299.00	**626B187G17**	630.00	**5250C81G17**	630.00
	4	④		⑥		**5250C81G18**	835.00
	5	⑤		⑦		**5250C81G19**	1,045.00
Arc Box	2, 3	**6714C74G09**	93.00	**6714C74G11**	93.00	**6714C74G11**	93.00
	4, 5	**6714C74G10**		**6714C74G12**	114.00	**6714C74G12**	114.00
Cross Bar	2, 3	**672B788G36**	99.00	**672B788G36**	99.00	**672B788G40**	99.00
	4, 5	**672B788G38**	128.00	**672B788G38**	128.00		
Upper Base	2, 3	**672B788G37**	149.00	**672B788G37**	149.00	**672B788G52**	149.00
	4, 5	**672B788G39**	202.00	**672B788G39**	202.00		
Lower Base	2, 3	**1250C33G03**	112.00	**1250C33G03**	112.00	**1250C33G10**	79.00
	4, 5	**1250C33G06**	152.00	**1250C33G06**	152.00		
KO Spring (Pk of 10)	All	**503C796G02**	50.50	**503C796G02**	50.50	**672B788G50**	50.50
Terminal Line/Load (Pk of 3)	All	**372B357G12**	42.50	**372B357G18**	42.50	**372B357G18**	42.50

① Model C contact tips and coils 00-4, 2-, 3-, 4- and 5-pole contactors are same as model J. All other parts are unavailable.
② Model K replaces Model J, offering superior design life characteristics. Renewal parts are different. Use parts for proper model only.
③ For 200 Amp A202 Magnetically Latched Lighting Contactors order 3-pole contact kit style 672B788G07.
④ Use Qty. 2 of 626B187G12.
⑤ Use Qty. 1 each of 626B187G12 and 626B187G13.
⑥ Use Qty. 2 of 626B187G16.
⑦ Use Qty. 1 each of 626B187G16 and 626B187G17.

Discount Symbol **1CD1C**

AC Starters, Contactors A200, A201 (Continued)

Accessories for Model J – K, Series 3, 4

Table 33-239. DC Coils ①

Voltage	Model J Size 3, 4	
	2-, 3-Pole	
	Style Number	Price U.S. $
24	**1255C68G04**	205.00
48	**1255C68G05**	205.00
125	**1255C68G01**	205.00
250	**1255C68G02**	205.00
125/250 ②	**1255C68G03**	205.00

① Use only on units originally supplied with DC coil.
② Dual Voltage Coils. Use only on contactors or starters originally supplied with dual voltage coil.

Table 33-240. AC Coils

Voltage	Hz	Model J Size 3, 4				Model K Size 4 ③			
		2-, 3-Pole		4-, 5-Pole		2-, 3-Pole		4-, 5-Pole	
		Style Number	Price U.S. $	Style Number	Price U.S. $	Style Number	Price U.S. $	Style Number	Price U.S. $
120/110	60/50	**505C633G01**	137.00	**505C635G01**	137.00	**5250C79G01**	137.00	**5250C80G01**	137.00
208	60	**505C633G02**	137.00	**505C635G02**	137.00	**5250C79G02**	137.00	**5250C80G02**	137.00
600/550	60/50	**505C633G05**	137.00	**505C635G05**	137.00	**5250C79G05**	137.00	**5250C80G05**	137.00
380	50	**505C633G07**	137.00	**505C635G07**	137.00	**5250C79G07**	137.00	**5250C80G07**	137.00
240/220	60/50	**505C633G12**	137.00	**505C635G12**	137.00	**5250C79G12**	137.00	**5250C80G12**	137.00
480/440	60/50	**505C633G13**	137.00	**505C635G13**	137.00	**5250C79G13**	137.00	**5250C80G13**	137.00
24	60	**505C633G34**	137.00	**N/A**	—	**5250C79G34**	137.00	**N/A**	—
277	60	**505C633G14**	137.00	**N/A**	—	**5250C79G14**	137.00	**N/A**	—
240/480 ④	60/60	**505C633G03**	137.00	**505C635G03**	137.00	**5250C79G03**	137.00	**5250C80G03**	137.00
120/244 ④	60/60	**505C633G10**	137.00	**505C635G10**	137.00	**5250C79G10**	137.00	**5250C80G10**	137.00

③ Model K replaces Model J, offering superior design life characteristics. Renewal parts are different. Use parts for proper model only.
④ Dual Voltage Coils. Use only on contactors or starters originally supplied with dual voltage coil.

A201 Contactors — Size 5 – 9

Table 33-241. GCA 530/630 — GPD 7, 8, 9 Kits ⑤

Part	Size 5		Size 6		Size 7		Size 8		Size 9	
	Style Number	Price U.S. $	Style Number	Price U.S. $	Style Number	Price U.S. $	Style Number	Price U.S. $	Style Number	Price U.S. $
Contact Kit (1 per pole)	**477B477G05** ⑥	377.00	**2066A10G11**	1,065.00	**461A757G17**	1,295.00	**646C829G05**	1,760.00	**5264C42G01** (R.C.) **5264C42G02** (F.C.)	3,935.00 3,935.00
Arc Box	**205A15G45**	428.00	**2066A10G45**	430.00	**831D580G01**	620.00	**831D580G01**	620.00	**9917D69G02**	⑧
Magnet Assy.	**205A15G46**	398.00	**2050A15G46**	398.00	**N/A**	—	**N/A**	—	**N/A**	—
Mag. Spg. Kit	**205A15G47**	71.00	**2050A15G47**	71.00	**N/A**	—	**N/A**	—	**N/A**	—
Acr Cup Kit	**205A15G48**	40.50	**N/A**	—	**N/A**	—	**N/A**	—	**N/A**	—
Load Conn. Kit	**205A15G49**	138.00	**2066A10G49**	124.00	**N/A**	—	**N/A**	—	**N/A**	—
Line Conn. Kit	**205A15G50**	99.00	**2066A10G50**	379.00	**N/A**	—	**N/A**	—	**N/A**	—
K.O. Spring – 6	**205A15G51**	59.00	**2066A10G46**	67.00	**N/A**	—	**N/A**	—	**N/A**	—
C.T. 300/5	**655C285H03**	228.00	**N/A**	—	**N/A**	—	**N/A**	—	**N/A**	—
C.T. 400/5	**655C285H04**	228.00								
C.T. 600/5 ⑦	**N/A**	—	**2066A10G18**	402.00	**N/A**	—	**N/A**	—	**N/A**	—
C.T. 800/5 ⑦	**N/A**	—	**2066A10G19**	402.00	**N/A**	—	**N/A**	—	**N/A**	—
Phase Barrier	**N/A**	—	**N/A**	—	**640C441G01**	107.00	**640C441G01**	107.00	**5264C35G03** (R.C.)	107.00
Cross Bar	**2050A15G12**	206.00	**2066A10G15**	665.00	**N/A**	—	**N/A**	—	**N/A**	—
Shunt	**N/A**	—	**2066A10G48**	116.00	**650C129G01**	124.00	**646C831G02** (Set of 3)	760.00	**5264C39G02** (Set of 4)	1,015.00

⑤ Catalog Number A201/A200 Series replaces GCA/GPD series. Renewal parts are the same.
⑥ Use 477B477G06 for Silver Tungsten applications.
⑦ C.T. kit which replaces the single molded 1 CT assembly used on the old size 6 airbreak. The kit includes a single molded 3 C.T. assembly, 2 bus bar and hardware. This C.T. kit also replaces the single molded 3 C.T. assembly used on the present size 6 airbreak and size vacuum.
⑧ Consult factory for prices.

Discount Symbol **1CD1C**

Accessories for A201 Contactors — Size 5 – 9

Table 33-242. Coils

Voltage	Hz	Size 5		Size 6	
		Style Number	Price U.S. $	Style Number	Price U.S. $
Sizes 5 and 6					
110/120	60	**2050A14G05**	265.	**2050A12G05**	373.
110/120	50	**2050A14G06**	265.	**2050A12G06**	373.
200/208	50	**2050A14G07**	265.	**2050A12G07**	373.
220/240	50	**2050A14G08**	265.	**2050A12G08**	373.
200/208	60	**2050A14G09**	265.	**2050A12G09**	373.
220/240	60	**2050A14G10**	265.	**2050A12G10**	373.
277/303	60	**2050A14G12**	265.	**2050A12G12**	373.
380/415	50	**2050A14G14**	265.	**2050A12G14**	373.
440/480	60	**2050A14G15**	265.	**2050A12G15**	373.
440/480	50	**2050A14G16**	265.	**2050A12G16**	373.
550/600	60	**2050A14G17**	265.	**2050A12G17**	373.
550/600	50	**2050A14G18**	265.	**2050A12G18**	373.
380/415	60	**2050A14G19**	265.	**2050A12G19**	373.
120/240	60	**2050A14G20**	265.	**2050A12G20**	373.
24 DC		**2050A14G21**	265.	**2050A12G21**	373.
48 DC		**2050A14G22**	265.	**2050A12G22**	373.
125 DC		**2050A14G25**	265.	**2050A12G25**	373.
250 DC		**2050A14G27**	265.	**2050A12G27**	373.

Line Voltage	Size 7, 8		Required
	Style Number	Price U.S. $	
Sizes 7 and 8			
115V DC	**438C805G01**	930.	2
125V DC	**438C805G04**	930.	2
230V DC	**438C805G02**	930.	2
250V DC	**438C805G03**	930.	2
110/120V AC ① ④	**438C805G12**	930.	2
220/240V AC ② ④	**438C805G11**	930.	2
380V AC ③ ④	**438C805G15**	930.	2
440/480V AC ③ ④	**438C805G10**	930.	2
550/575V AC ③ ④	**438C805G13**	930.	2

Line Voltage	Size 9	
	Style Number	Price U.S. $
Size 9		
110V DC	**5264C34G01** ⑤	930.

① Rectifier 125V 2018A40G01 (1 required).
② Rectifier 250V 2018A40G02 (1 required).
③ Rectifier 600V 2018A40G03 (1 required).
④ These coils require an external rectifier. If the rectifier needs replacement, order by the appropriate style number.
⑤ Contains coil and resistor.

Discount Symbol **1CD1C**

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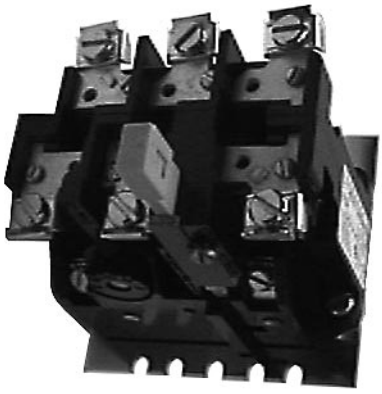


Type A Overload Relay 3-Pole Panel Mount

Product Description

Type B and Type A, Class 20 Thermal Overload Relays will protect the motor against abnormal overload conditions. Bimetallic actuated, they are available as either ambient compensated or non-compensated in either single-pole or block type three-pole design. The Type B use one pole of the three-pole block for single-phase.

Single-pole relays are also available as Fast Trip Class 10 ambient compensated type, which provides approximately 125% motor protection with a tripping time of less than 10 seconds, at 600% of heater current rating.

Fast trip relays can be identified by the green reset rods. They are available for panel or starter mounting. The three-pole fast trip design is composed of three single-pole relays on a common baseplate, with a common reset bar.

The bimetal element is actuated by precisely calibrated heater elements which are connected directly in the circuit to be protected. Thermal actuation of this device opens the contacts in the coil circuit of a contactor or relay which results in the disconnection of power to the overloaded circuit.

Interchangeable thermal heater elements for single-pole standard trip and block type overload relays are available to cover motor full load currents from .29 to 133A in approximately 10% steps (see Heater Application Table). Fast trip overload relays do not have interchangeable heater elements but are available in a series of ratings to cover motor full load currents from 1.6 to 150A in approximately 50% steps.

Design Features

Manual or Automatic Reset

The Type B is furnished with a manual reset. The Type A is normally furnished set for manual reset operation and may be quickly adjusted for automatic reset when required. Automatic reset should not be used with 2-wire control or where automatic restarting would endanger either personnel or equipment.

Trip Indication

An immediate visible indication of trip is provided on the overload relay. When an overload occurs, which causes the relay to operate, a trip indicator projects out and thus shows positive visual indication of trip. The Type B has a mechanical trip bar to manually check the NC contact operation on the overload relay.

Adjustable Trip

On the Type A, the trip rating of a specific heater element can be adjusted over a range of approximately 85% to 115% of its respective rating to permit the desired close protection.

This is accomplished by turning the adjusting knob on the relay to the respective stop position.

Positive Contact Break

A follow-through contact, provided on the stationary terminal of the snap action control switch, provides reliable electrical continuity during toggling, thus eliminating false trip sometimes prevalent with thermally operated switches. This contact also allows contact wipe for further reliability.

Ambient Compensation

Motor overload protection can be provided with the same trip characteristics in ambient temperature from -40° to 77°C (-40° to 167°F). A compensating bimetal maintains a constant "travel to trip" distance independent of ambient conditions. The compensating feature is fully automatic and no adjustments are required over wide fluctuations in ambient temperatures. Compensated relays are identified by black reset rods on the Type A and light gray reset rods on the Type B, while non-compensated relays use red reset rods. AA three-pole units have gray reset rods. AA one-pole units have black reset rods.

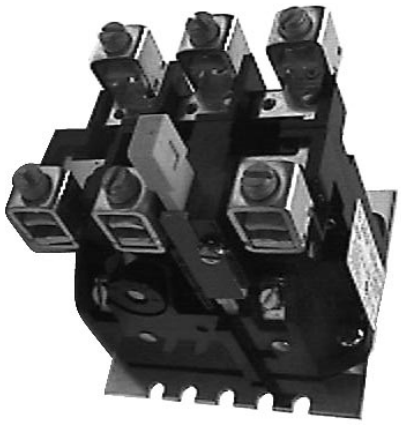
Control Contact

Single-pole and block type relays are supplied as standard with a SPST NC control contact. A SPDT NO-NC with common is available as a factory modification on the Type A. An isolated NO contact can be supplied on the Type B as either a factory modification or as a field kit.

Instruction Leaflets

14885B	Fast Trip A Sizes 0 – 4, 3-Pole OL Relay
14567E	Type A Sizes 1 – 2, 1-Pole OL Relay Mod A
14568	Type A Sizes 1 – 2, 3-Pole OL Relay Mod J
14570D	Type A Sizes 3 – 4, 3-Pole OL Relay Mod J
14569C	Type A Sizes 3 – 4, 1-Pole OL Relay Mod A
17093A	Type B OLR for Sizes 7, 8 and 9 Contactors
16955A	Type B Sizes 1 – 2, 1-Pole OL Relay
16954A	Type B Sizes 1 – 2, 3-Pole OL Relay
15392B	Type B Sizes 3 – 4, 3-Pole OL Relay
13676F	Fast Trip Sizes 0 – 4, 1-Pole OL Relay

Thermal Type B, Class 20, Manual Reset



Type B Overload Relay Panel Mounting

Application Description

The Type B overload relay is designed to protect industrial motors against overload conditions. Using modern block type, bimetallic design, this relay will provide Class 20 operation in either single-phase or 3-phase applications.

Features

- Ambient compensation standard
- Alarm contact field mountable
- Class 20 — 600V design
- Inverse time delay trip
- Test trip device for weld check
- Hi-visibility up-front trip indication
- Trip-free reset mechanism

Operation

The Type B overload relay is a bimetallic actuated device. The bimetal elements are operated by precisely calibrated heaters. The heater elements are connected either directly in the circuit to be measured, or through current transformers on applications NEMA Size 5 and larger.

As the bimetals are heated by motor current flow, a deflection force is produced. Upon a sustained level of abnormal current flow, the deflection becomes great enough to open the snap-action output contact.

Ambient Compensation

The Type B ambient compensated design is supplied as standard on all A200 starters. This design uses a second compensating bimetal responsive to ambient air temperature in the surrounding enclosure. This feature reduces nuisance tripping in applications using compact control panels and motor control centers where internal temperature rise is significant compared to motor ambient temperature. The compensating characteristic is maintained in ambient temperatures from 40° to 77°C.

Standards and Certifications

- UL508
- CSA
- ANSI/NEMA ICS 2-222

Technical Data

Table 33-243. Control Contact Ratings — NEMA B600 NO and NC Control Contact Rating

AC Volts	Make	Break
24 – 120	30A	3A
120 – 600	3600 VA	360 VA

Accessories

Table 33-244. Alarm Contact Kit Selection ①

Type B Overload Relay Size	Catalog Number	Price U.S. $
1, 2	**B3NO-2**	21.40
3, 4	**B3NO-4**	21.40

① Alarm contact available as factory modification of field mountable. For factory modification, add suffix B.

Product Selection

Heaters

Enter heaters as separate item by listing Catalog Number from tables, **Pages 33-148 – 33-149**, as required per starter.

Relays

Table 33-245. Product Selection — Thermal Type B Overload Relay Selection

Motor Full Load Amps	Panel Mounted Catalog Numbers		Starter Mounted Catalog Numbers				Price U.S. $
			Replacement for Type B Overload Relays		Replacement for Type A Overload Relays in Manual Reset Mode (3-Pole Only) ②		
	Ambient Comp.	Non comp.	Ambient Comp.	Non-comp.	Ambient Comp.	Non-comp.	
Single-Pole (One NC Contact)							
.25 – 26.2	**BA11JP**	**BN11JP**	**BA11A**	**BN11A**	—	—	32.25
26.3 – 45	**BA21JP**	**BN21JP**	**BA21A**	**BN21A**	—	—	46.25
19 – 90 19 – 135	Use 3-Pole Design, Wire 3 Poles in Series						
Three-Pole (One NC Contact)							
.25 – 26.2	**BA13JP**	**BN13JP**	**BA13A** ③	**BN13A** ③	**BA13J**	**BN13J**	64.50
26.3 – 45	**BA23JP**	**BN23JP**	**BA23A**	**BN23A**	**BA23J**	**BN23J**	92.50
19 – 90	**BA33P**	**BN33P**	**BA33A**	**BN33A**	**BA33A**	**BN33A**	123.00
19 – 135	**BA43P**	**BN43P**	**BA43A**	**BN43A**	**BA43A**	**BN43A**	193.00

② Includes contactor mounting bracket, overload relay and connection straps to contactor.

③ For replacement on B200 size 00, 0, 1 use BA23A instead of BA13A and use BN23A instead of BN13A.

Discount Symbol **1CD1C**

Dimensions

Not to be used for construction purposes unless approved.

Table 33-246. Thermal Type B Overload Relays Dimensions

Relay Size	Approximate Dimensions in Inches (mm)			
	A	B	C	D
3	3.13 (79.5)	4.06 (103.1)	.44 (11.2)	.31 (7.9)
4	3.38 (85.9)	4.38 (111.3)	.31 (7.9)	.19 (4.8)

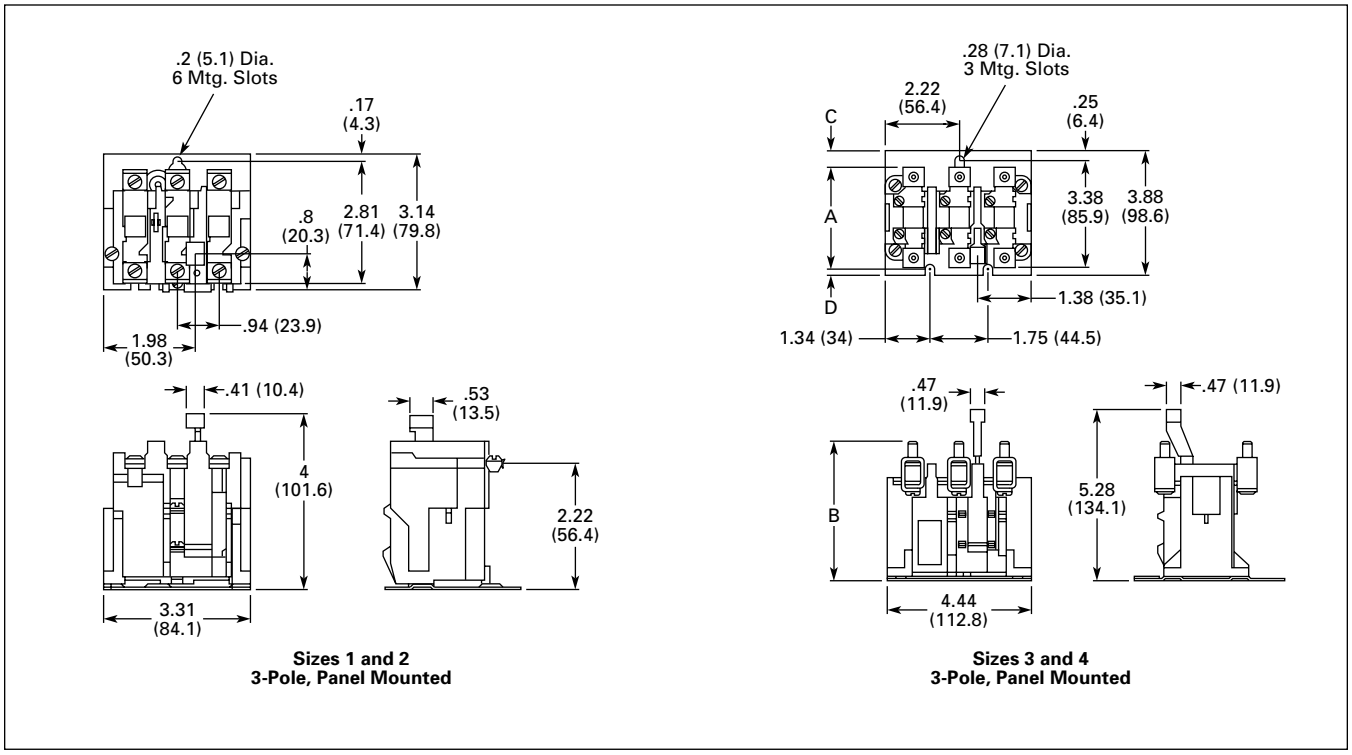


Figure 33-52. Thermal Type B Overload Relays Dimensions in Inches (mm)

Thermal Type A, Class 20, Auto/Manual Reset

Type A Overload Relay
1-Pole Panel Mounting

Application Description

The Type A overload relay is designed to protect industrial motors against overload conditions. Using modern block type, bimetallic design, this relay will provide Class 20 operation in either single- or 3-phase applications.

Features

- Field selectable manual/auto reset
- Alarm contract factory available
- Class 20 — 600V design
- Inverse time delay trip
- Adjustable trip rating ± 15%
- Color coded reset rod:
  - Compensated (Gray)
  - Non-compensated (Red)

Operation

The Type A overload relay is a bimetallic actuated device. The bimetal elements are operated by precisely calibrated heaters. The heater elements are connected either directly in the circuit to be measured, or through current transformers on applications NEMA Size 5 and larger.

As the bimetals are heated by motor current flow, a deflection force is produced. Upon a sustained level of abnormal current flow, the deflection becomes great enough to open the snap-action output contact.

Automatic Reset

The Type A overload relay can be supplied as an option on all A200 starters to provide automatic reset operation. The overload relay is always shipped in the non-automatic mode. To set up auto operation, reposition the reset rod by loosening and re-tightening a hold-down clamp at the base of overload relay.

Standards and Certifications

- UL508
- CSA
- ANSI/NEMA ICS 2-222

Technical Data

Table 33-247. Control Contact Ratings

AC Volts	Normally Closed		Normally Open	
	Make	Break	Make	Break
Three-Pole Control Contact Ratings				
24 – 120 120 – 600	20A 2400 VA	2A 240 VA	.5A 600 VA	.5A 60 VA
One-Pole Control Contact Ratings				
24 – 120 120 – 600	30A 3600 VA	3A 360 VA	10A 1200 VA	1A 120 VA

Product Selection

Heaters

Enter heaters as separate item by listing Catalog Number from tables, **Pages 33-148 – 33-149**, as required per starter.

Relays

Table 33-248. Product Selection — Thermal Type A Overload Relay Selection

Motor Full Load Amps	Panel Mounted Catalog Number		Starter Replacement Catalog Number		Price U.S. $
	Ambient Comp.	Non-comp.	Ambient Comp.	Non-comp.	
Single-Pole (One NC Contact)					
.25 – 26.2	**AA11P**	**AN11P**	**AA11A**	**AN11A**	45.25
26.3 – 45	**AA21P**	**AN21P**	**AA21A**	**AN21A**	64.50
19 – 90	**AA31P**	**AN31P**	**AA31A**	**AN31A**	85.00
19 – 135	**AA41P**	**AN41P**	**AA41A**	**AN41A**	135.00
Three-Pole (One NC Contact)					
.25 – 26.2	**AA13P** ①	**AN13P** ①	**AA13A** ①	**AN13A** ①	88.00
26.3 – 45	**AA23P** ①	**AN23P** ①	**AA23A** ①	**AN23A** ①	128.00
19 – 90	**AA33P** ①	**AN33P** ①	**AA33A** ①	**AN33A** ①	169.00
19 – 135	**AA43P** ①	**AN43P** ①	**AA43A** ①	**AN43A** ①	268.00

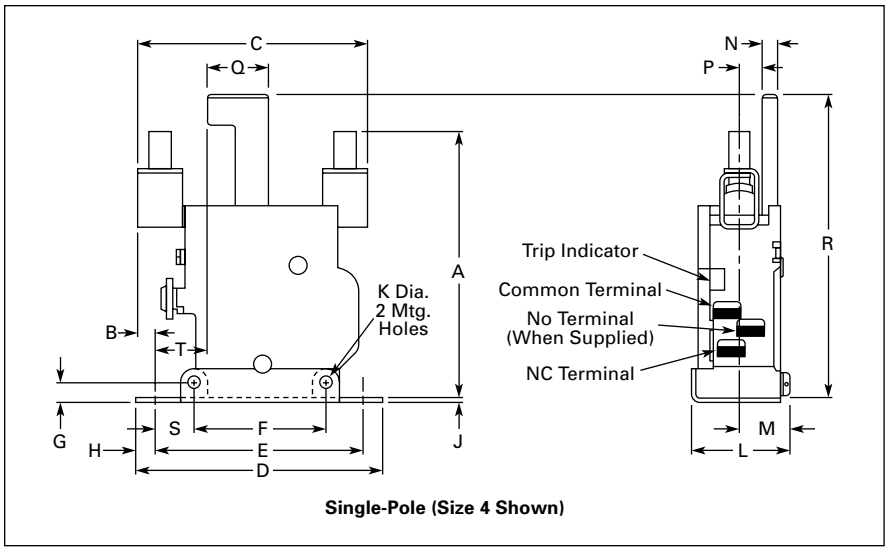
Note: For Alarm Contact (Form C), add Suffix **B**. Available only as factory modification on Type A relay. **Adder U.S. $** 54.00

① 3-Pole Type B Overload Relay is a suitable alternative to a 3-Pole Type A Overload Relay in Manual Reset Mode. For example, BA13JP for AA13P, BN23J for AN23A, etc. (See **Page 33-142**.)

Discount Symbol **1CD1C**

Dimensions

Not to be used for construction purposes unless approved.



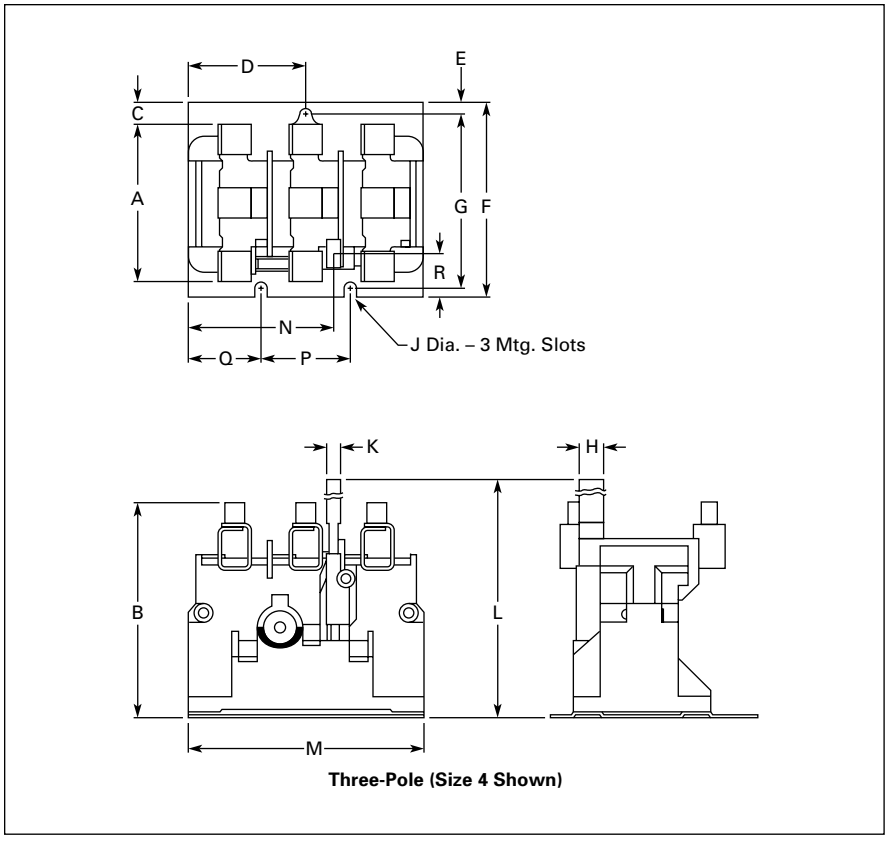
Single-Pole (Size 4 Shown)

Figure 33-53. Type A Single-Pole Approximate Dimensions

Table 33-249. Type A Single-Pole — Approximate Dimensions in Inches (mm)

Dim.	Relay Size			
	1	2	3	4
A	2.72 (69.1)	3.48 (88.4)	4.19 (106.4)	4.5 (114.3)
B	.94 (23.9)	.67 (17.0)	.25 (6.4)	.38 (9.7)
C	2.75 (69.9)	3.5 (88.9)	3.53 (89.7)	3.78 (96.0)

Dim.	1, 2	3, 4
D	3.25 (82.6)	4.13 (104.9)
E	2.63 (66.8)	3.38 (85.9)
F	1.34 (34.0)	2.19 (55.6)
G	.25 (6.4)	.28 (7.1)
H	.31 (7.9)	.38 (9.7)
J	.06 (1.5)	.06 (1.5)
K	.22 (5.6)	.27 (6.8)
L	1.34 (34.0)	1.69 (42.9)
M	.66 (16.8)	.88 (22.4)
N	.16 (4.1)	.27 (6.8)
P	.22 (5.6)	.34 (8.6)
Q	.06 (1.5)	.69 (17.5)
R	4.00 (101.6)	5.19 (131.8)
S	.47 (11.9)	.59 (15.0)
T	1.11 (28.2)	.69 (17.5)



Three-Pole (Size 4 Shown)

Figure 33-54. Type A Three-Pole Approximate Dimensions

Table 33-250. Type A Three-Pole — Approximate Dimensions in Inches (mm)

Dim.	Relay Size			
	1	2	3	4
A	2.38 (60.5)	2.44 (62.0)	3.13 (79.5)	3.38 (85.9)
B	3.13 (79.5)	3.17 (80.5)	4.06 (103.1)	4.38 (111.3)
C	.36 (9.1)	.33 (8.4)	.44 (11.2)	.31 (7.9)

Dim.	1, 2	3, 4
D	1.66 (42.2)	2.22 (56.4)
E	.17 (4.3)	.25 (6.4)
F	2.81 (71.4)	3.38 (85.9)
G	3.08 (78.2)	3.88 (98.6)
H	.47 (11.9)	.47 (11.9)
J	.20 (5.1)	.28 (7.1)
K	.28 (7.1)	.47 (11.9)
L	4.00 (101.6)	5.28 (134.1)
M	3.31 (84.1)	4.44 (112.8)
N	1.80 (45.7)	2.77 (70.4)
P	1.89 (48.0)	1.75 (44.5)
Q	1.00 (25.4)	1.34 (34.0)
R		1.03 (26.2)

Type FT Fast Trip, Class 10

Application Description

The Type FT overload relay is designed to protect special purpose motors having restricted thermal and locked rotor capabilities. Using modern block type, bimetallic design, this relay will provide Class 10 operation in single- or three-phase applications.

Operation

The Type FT overload relay is a bimetallic actuated device. The bimetal elements are operated directly from line current, thus separate calibrating heater elements are not utilized. The overload relay may be wired directly in the motor circuit, or through-current transformers on applications larger than 150A.

As the bimetals are heated by motor current flow, a deflection force is produced. Upon a sustained level of abnormal current flow, the deflection becomes great enough to open the snap action output contact.

Features

- Class 10 — 600V design
- Inverse time delay trip
- Color coded reset rod — green
- Alarm contact factory available
- Field selectable manual/auto reset
- Adjustable trip rating ±20%
- Ambient compensation included

Technical Data

Table 33-251. Control Contact Ratings

AC Volts	Normally Closed		Normally Open	
	Make	Break	Make	Break
24 – 120	30A	3A	10A	1A
120 – 600	3600 VA	360 VA	1200 VA	120 VA

Product Selection

Table 33-252. Type FT Single-Pole (One NC Contact); Three-Phase (Three NC Contacts in Series)

Motor Full Load Amperes	Panel Mounted				Starter Replacement		
	Single-Pole		Three-Pole		NEMA Size	Single-Pole	
	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $		Catalog Number	Price U.S. $
.76 – 1.1	**FT11P-1.1**	58.00	**FT13P-1.1**	172.00	—	**FT11A-1.1**	58.00
1.1 – 1.6	**FT11P-1.6**	58.00	**FT13P-1.6**	172.00	—	**FT11A-1.6**	58.00
1.6 – 2.4	**FT11P-2.4**	58.00	**FT13P-2.4**	172.00	0, 1	**FT11A-2.4**	58.00
2.4 – 3.6	**FT11P-3.6**	58.00	**FT13P-3.6**	172.00	0, 1	**FT11A-3.6**	58.00
3.6 – 5.4	**FT11P-5.4**	58.00	**FT13P-5.4**	172.00	0, 1	**FT11A-5.4**	58.00
5.4 – 8.0	**FT11P-8.0**	58.00	**FT13P-8**	172.00	0, 1	**FT11A-8**	58.00
8.0 – 12	**FT11P-12**	58.00	**FT13P-12**	172.00	0, 1	**FT11A-12**	58.00
12 – 18	**FT11P-18**	58.00	**FT13P-18**	172.00	1	**FT11A-18**	58.00
16 – 24	**—**	—	**FT13P-24**	172.00		**—**	—
22 – 32	**FT11P-32**	58.00	**FT13P-32**	172.00	0, 1	**FT11A-32**	58.00
24 – 36	**FT21P-36**	71.50	**FT23P-36**	214.00	2	**FT21A-36**	71.50
36 – 54	**FT21P-54**	71.50	**FT23P-54**	214.00	2	**FT21A-54**	71.50
22 – 32	**FT31P-32**	86.00	**FT33P-32**	257.00	3	**FT31A-32**	86.00
32 – 48	**FT31P-48**	86.00	**FT33P-48**	257.00	3	**FT31A-48**	86.00
48 – 72	**FT31P-72**	86.00	**FT33P-72**	257.00	3	**FT31A-72**	86.00
72 – 110	**FT41P-110**	123.00	**FT43P-110**	363.00	4	**FT41A-110**	123.00
100 – 150	**FT41P-150**	123.00	**FT43P-150**	363.00	4	**FT41A-150**	123.00

Note: Single-Pole (1NO-NC Contact): Add Suffix **B**.
Three-Pole (3NO-NC Contacts): Add Suffix **B**. Example: FT13P**B**-12.

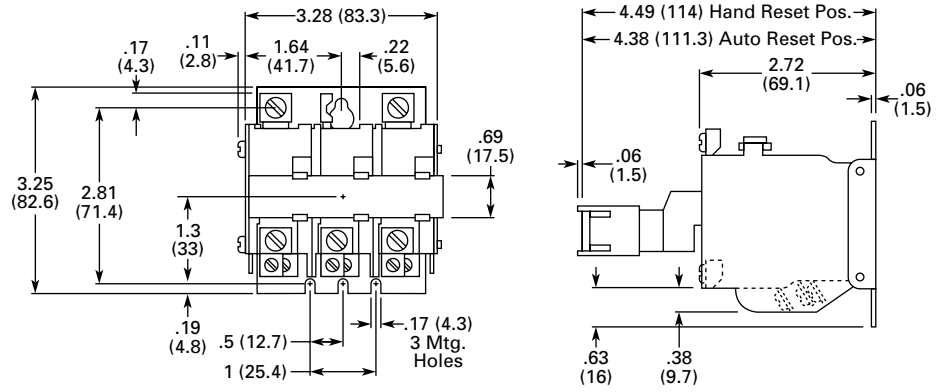
Discount Symbol **1CD1C**

Dimensions

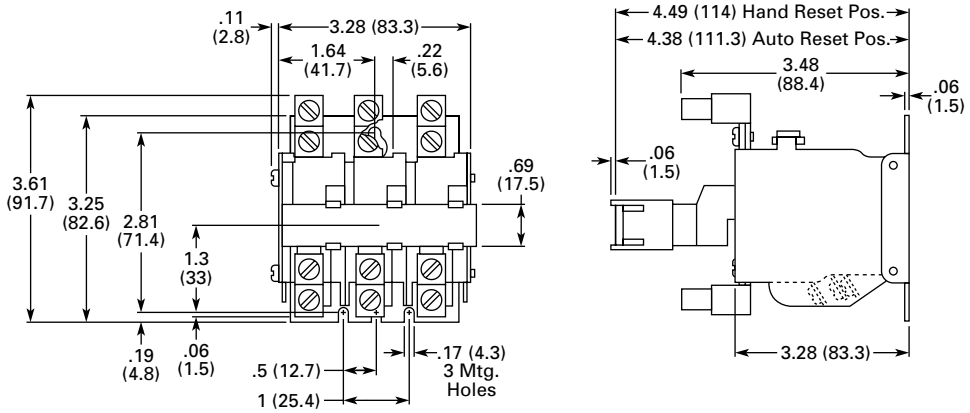
Not to be used for construction purposes unless approved.

Table 33-253. Type FT Overload Relays Dimensions

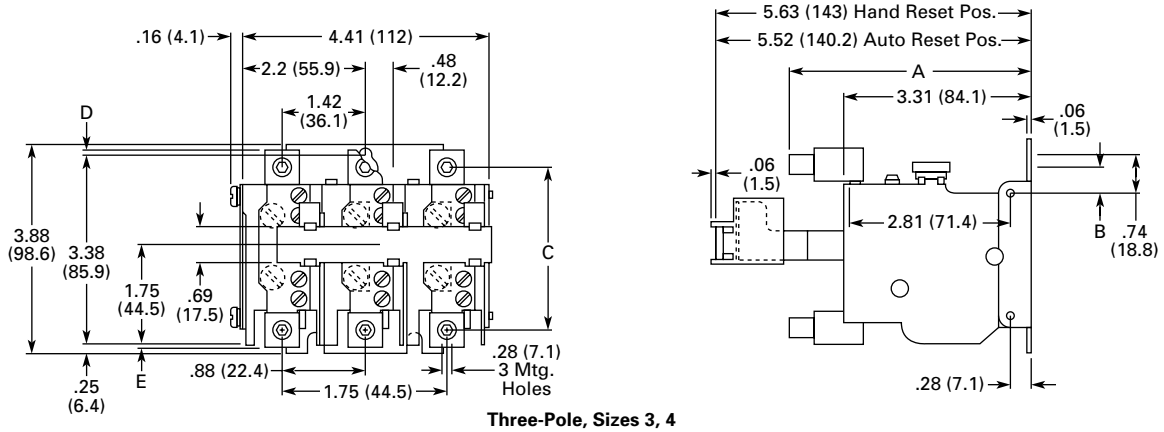
Relay Size	Approximate Dimensions in Inches (mm)				
	A	B	C	D	E
3	4.25 (108.0)	.53 (13.5)	2.91 (73.9)	.09 (2.3)	.06 (1.5)
4	4.50 (114.3)	.59 (15.0)	3.03 (77.0)	.22 (5.6)	.19 (4.8)



Three-Pole, Size 1



Three-Pole, Size 2



Three-Pole, Sizes 3, 4

Figure 33-55. Type FT Overload Relays Dimensions in Inches (mm)

Heater Selection

General Information on Heater Coil Selection

For maximum motor protection and compliance with Article 430-32 of the National Electrical Code, select heater coils from the tables in this section on the basis of motor nameplate full load current.

When the full load current is unknown, selection may be made on the basis of average full load currents as shown on **Pages 33-164 – 33-165** of the Cutler-Hammer product guide. **Caution — The average ratings could be high or low for a specific motor and therefore selection on this basis always involves risk. For fully reliable motor protection, select heater coils on the basis of full load current rating as shown on the motor nameplate.**

Heater coils are rated to protect 40°C rise motors, and open and drip-proof motors having a **service factor of 1.15** where the motor and the controller are at the same ambient temperature.

For other conditions:

1. For 50°C, 55°C, 75°C rise motors and **enclosed motors having a service factor of 1.0, select one size smaller coil.**
2. Ambient temperature of controller lower than motor by 26°C (47°F), use one size smaller coil.
3. Ambient temperature of controller higher than motor by 26°C (47°F), use one size larger coil.

Ultimate tripping current of heater coils is approximately 1.25 times the minimum current rating listed in the tables.

Table 33-254. Heater Selection — Type A and B Overload Relays, Sizes 3 and 4

Size Starter	Ambient Compensated Enclosed Starters	Non-compensating Enclosed Starters	Heater Catalog Number	Price U.S. $
	All Applications			
	Full Load Current of Motor Amps			
For Size 4 Starters	12.8 – 14.1	11.9 – 13.0	**FH68**	10.70
	14.2 – 15.5	13.1 – 14.3	**FH69**	10.70
	15.6 – 17.1	14.4 – 15.9	**FH70**	10.70
	17.2 – 18.9	16.0 – 17.4	**FH71**	10.70
	19.0 – 20.8	17.5 – 19.1	**FH72**	10.70
	20.9 – 22.9	19.2 – 21.1	**FH73**	10.70
	23.0 – 25.2	21.2 – 23.2	**FH74**	10.70
	25.3 – 27.8	23.3 – 25.6	**FH75**	10.70
	27.9 – 30.6	25.7 – 28.1	**FH76**	10.70
	30.7 – 33.5	28.2 – 30.8	**FH77**	10.70
	33.6 – 37.5	30.9 – 34.5	**FH78**	10.70
	37.6 – 41.5	34.6 – 38.2	**FH79**	10.70
	41.6 – 56.3	38.3 – 42.6	**FH80**	10.70
	46.4 – 50	42.7 – 46	**FH81**	10.70
	51 – 55	47 – 51	**FH82**	10.70
	56 – 61	52 – 56	**FH83**	10.70
	62 – 66	57 – 61	**FH84**	10.70
	67 – 73	62 – 67	**FH85**	10.70
	74 – 78	68 – 72	**FH86**	10.70
	79 – 84	73 – 77	**FH87**	10.70
	85 – 92	78 – 84	**FH88**	10.70
For Size 3 Starters	93 – 101	85 – 91	**FH89**	10.70
	102 – 110	92 – 99	**FH90**	10.70
	111 – 122	100 – 110	**FH91**	10.70
	123 – 129	111 – 122	**FH92**	10.70
	130 – 133	123 – 128	**FH93**	10.70
	—	129 – 133	**FH94**	10.70

Table 33-255. Heater Selection — Type A and B Overload Relays, Sizes 5 and 6

Compensated Overload Relay		Heater Catalog Number	Price U.S. $
Open Starter	Enclosed Starter		
Full Load Current of Motor (Amps)			
Size 5 (with 300/5 Current Transformers)			
—	—	**FH23**	10.70
118 – 129	118 – 129	**FH24**	10.70
130 – 141	130 – 141	**FH25**	10.70
142 – 155	142 – 155	**FH26**	10.70
156 – 170	156 – 170	**FH27**	10.70
171 – 187	171 – 187	**FH28**	10.70
188 – 205	188 – 205	**FH29**	10.70
206 – 224	206 – 224	**FH30**	10.70
225 – 244	225 – 244	**FH31**	10.70
245 – 263	245 – 263	**FH32**	10.70
264 – 292	264 – 292	**FH33**	10.70
293 – 300	—	**FH34**	10.70
Size 6 (with 600/5 Current Transformers)			
—	—	**FH23**	10.70
236 – 259	236 – 259	**FH24**	10.70
260 – 283	260 – 283	**FH25**	10.70
284 – 310	284 – 310	**FH26**	10.70
311 – 340	311 – 340	**FH27**	10.70
341 – 374	341 – 374	**FH28**	10.70
375 – 411	375 – 411	**FH29**	10.70
412 – 448	412 – 448	**FH30**	10.70
449 – 489	449 – 489	**FH31**	10.70
490 – 527	490 – 527	**FH32**	10.70
528 – 585	528 – 540	**FH33**	10.70
586 – 600	—	**FH34**	10.70

Note: Size 7 and Larger — Advise Full Load Current.

Discount Symbol **1CD1C**

Table 33-256. Heater Selection — Type A and B Overload Relays, Sizes 0, 1 and 2

Size Starter	Non-compensated Open Starters and Ambient Comp. Open and Enclosed Starters		Heater Catalog Number	Price U.S. $	Non-compensating Enclosed Starters		Heater Catalog Number	Price U.S. $
	Block Type Overload Using 3 Heaters	Single-Pole Type Overload			Block Type Overload Using 3 Heaters	Single-Pole Type Overload		
	Full Load Current of Motor (Amps)							
For Size 2 Starters	.25 – .27	.29 – .31	FH03	10.70	.24 – .25	.28 – .30	FH03	10.70
	.28 – .31	.32 – .35	FH04	10.70	.26 – .28	.31 – .34	FH04	10.70
	.32 – .34	.36 – .39	FH05	10.70	.29 – .31	.35 – .37	FH05	10.70
	.35 – .38	.40 – .43	FH06	10.70	.32 – .35	.38 – .42	FH06	10.70
	.39 – .42	.44 – .48	FH07	10.70	.36 – .39	.43 – .47	FH07	10.70
	.43 – .46	.49 – .53	FH08	10.70	.40 – .43	.48 – .52	FH08	10.70
	.47 – .50	.54 – .58	FH09	10.70	.44 – .47	.53 – .56	FH09	10.70
	.51 – .55	.59 – .64	FH10	10.70	.48 – .51	.57 – .63	FH10	10.70
	.56 – .62	.65 – .71	FH11	10.70	.52 – .57	.64 – .70	FH11	10.70
	.63 – .68	.72 – .79	FH12	10.70	.58 – .63	.71 – .77	FH12	10.70
	.69 – .75	.80 – .87	FH13	10.70	.64 – .70	.78 – .85	FH13	10.70
	.76 – .83	.88 – .96	FH14	10.70	.71 – .77	.86 – .94	FH14	10.70
	.84 – .91	.97 – 1.06	FH15	10.70	.78 – 85	.95 – 1.03	FH15	10.70
	.92 – 1.00	1.07 – 1.16	FH16	10.70	.86 – .93	1.04 – 1.13	FH16	10.70
	1.01 – 1.11	1.17 – 1.28	FH17	10.70	.94 – 1.03	1.14 – 1.25	FH17	10.70
	1.12 – 1.22	1.29 – 1.41	FH18	10.70	1.04 – 1.13	1.26 – 1.38	FH18	10.70
	1.23 – 1.34	1.42 – 1.55	FH19	10.70	1.14 – 1.25	1.39 – 1.52	FH19	10.70
	1.35 – 1.47	1.56 – 1.71	FH20	10.70	1.26 – 1.37	1.53 – 1.67	FH20	10.70
	1.48 – 1.62	1.72 – 1.87	FH21	10.70	1.38 – 1.51	1.68 – 1.83	FH21	10.70
	1.63 – 1.78	1.88 – 2.06	FH22	10.70	1.52 – 1.65	1.84 – 2.01	FH22	10.70
For Size 0 Starters	1.79 – 1.95	2.07 – 2.26	FH23	10.70	1.66 – 1.81	2.02 – 2.21	FH23	10.70
	1.96 – 2.15	2.27 – 2.48	FH24	10.70	1.82 – 1.99	2.22 – 2.43	FH24	10.70
	2.16 – 2.35	2.49 – 2.72	FH25	10.70	2.00 – 2.19	2.44 – 2.66	FH25	10.70
	2.36 – 2.58	2.73 – 2.99	FH26	10.70	2.20 – 2.39	2.67 – 2.92	FH26	10.70
	2.59 – 2.83	3.00 – 3.28	FH27	10.70	2.40 – 2.63	2.93 – 3.21	FH27	10.70
	2.84 – 3.11	3.29 – 3.60	FH28	10.70	2.64 – 2.89	3.22 – 3.53	FH28	10.70
	3.12 – 3.42	3.61 – 3.95	FH29	10.70	2.90 – 3.17	3.54 – 3.87	FH29	10.70
	3.43 – 3.73	3.96 – 4.31	FH30	10.70	3.18 – 3.47	3.88 – 4.22	FH30	10.70
	3.74 – 4.07	4.32 – 4.71	FH31	10.70	3.48 – 3.79	4.23 – 4.61	FH31	10.70
	4.08 – 4.39	4.72 – 5.14	FH32	10.70	3.80 – 4.11	4.62 – 4.9	FH32	10.70
	4.40 – 4.87	5.15 – 5.6	FH33	10.70	4.12 – 4.55	5.0 – 5.5	FH33	10.70
	4.88 – 5.3	5.7 – 6.2	FH34	10.70	4.56 – 5.0	5.6 – 6.0	FH34	10.70
	5.4 – 5.9	6.3 – 6.8	FH35	10.70	5.1 – 5.5	6.1 – 6.6	FH35	10.70
	6.0 – 6.4	6.9 – 7.5	FH36	10.70	5.6 – 5.9	6.7 – 7.3	FH36	10.70
	6.5 – 7.1	7.6 – 8.2	FH37	10.70	6.0 – 6.6	7.4 – 8.0	FH37	10.70
	7.2 – .78	8.3 – 9.0	FH38	10.70	6.7 – 7.2	8.1 – 8.7	FH38	10.70
	7.9 – 8.5	9.1 – 9.9	FH39	10.70	7.3 – 7.9	8.8 – 9.7	FH39	10.70
	8.6 – 9.4	10.0 – 10.8	FH40	10.70	8.0 – 8.7	9.8 – 10.5	FH40	10.70
	9.5 – 10.3	10.9 – 11.9	FH41	10.70	8.8 – 9.5	10.6 – 11.7	FH41	10.70
	10.4 – 11.3	12.0 – 13.1	FH42	10.70	9.6 – 10.5	11.8 – 12.7	FH42	10.70
	11.4 – 12.4	13.2 – 14.3	FH43	10.70	10.6 – 11.5	12.8 – 14.0	FH43	10.70
	12.5 – 13.5	14.4 – 15.7	FH44	10.70	11.6 – 12.6	14.1 – 15.3	FH44	10.70
	13.6 – 14.9	15.8 – 17.2	FH45	10.70	12.7 – 13.8	15.4 – 16.6	FH45	10.70
	15.0 – 16.3	17.3 – 18.9	FH46	10.70	13.9 – 15.1	16.7 – 18.3	FH46	10.70
	16.4 – 18.0	19.0 – 20.8	FH47	10.70	15.2 – 16.7	18.4 – 20.0	FH47	10.70
	18.1 – 19.8	20.9 – 22.9	FH48	10.70	16.8 – 18.3	20.1 – 21.9	FH48	10.70
	19.9 – 21.7	23.0 – 25.2	FH49	10.70	18.4 – 20.2	22.0 – 23.9	FH49	10.70
	21.8 – 23.9	25.3 – 27.6	FH50	10.70	20.3 – 22.2	24.0 – 26.2	FH50	10.70
For Size 1 Starters	24.0 – 26.2	27.7 – 30.3	FH51	10.70	22.3 – 24.3	26.3 – 28.8	FH51	10.70
	26.3 – 28.7	30.4 – 33.3	FH52	10.70	24.4 – 26.6	28.9 – 31.4	FH52	10.70
	28.8 – 31.4	33.4 – 36.4	FH53	10.70	26.7 – 29.1	31.5 – 34.5	FH53	10.70
	31.5 – 34.5	36.5 – 39.9	FH54	10.70	29.2 – 32.0	34.6 – 37.9	FH54	10.70
	34.6 – 37.9	40.0 – 43.9	FH55	10.70	32.1 – 35.2	3.80 – 41.9	FH55	10.70
	38.0 – 41.5		FH56	10.70	35.3 – 38.5	42.0 – 45.0	FH56	10.70
	41.6 – 45.0		FH57	10.70	38.6 – 42.3		FH57	10.70

Discount Symbol **1CD1C**

For Catalog Numbers A10, A11, A13, A30, A31, A40, A41, A50, A51, A70, A71, A80, A81, B10, B11, B50, B51, B52, C10, C30 and C50 Contactors and Starters

Note: For a complete listing of parts refer to the Renewal Parts Publication Number referenced on the device nameplate.

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Table 33-257. Citation Renewal Parts

Description		Size 00					Size 0	
		Series A1 ①	Series B1	Series C1	Series D1/C2	Price U.S. $		
		Part Number	Part Number	Part Number	Part Number		Part Number	Price U.S. $
Set of Contacts								
Part Number on Contactor or Starter Nameplate								
2-Pole without Interlock		**6-21**	②	②	②		**6-22**	58.50
3-Pole without Interlock		**6-21-2**	②	②	②		**6-22-2**	87.50
3-Pole with Interlock		**6-21-3**	②	②	②		**—**	—
4-Pole without Interlock		**—**	**—**	**—**	**—**	—	**6-22-3**	117.00
5-Pole without Interlock		**—**	**—**	**—**	**—**	—	**6-22-4**	146.00
Magnet Coils	**Coil Suffix**							
120V 60 Hz or 110V 50 Hz	**A**	**9-1945-1**	④	**9-2650-1**	**9-2823-1**	61.00	**9-1887-1**	61.00
240V 60 Hz or 220V 50 Hz	**B**	**9-1945-2**	④	**9-2650-2**	**9-2823-2**	61.00	**9-1887-2**	61.00
480V 60 Hz or 440V 50 Hz	**C**	**9-1945-3**	④	**9-2650-3**	**9-2823-3**	61.00	**9-1887-3**	61.00
600V 60 Hz or 550V 50 Hz	**D**	**9-1945-4**	④	**9-2650-4**	**9-2823-4**	61.00	**9-1887-4**	61.00
208V 60 Hz	**E**	**9-1945-5**	④	**9-2650-5**	**9-2823-5**	61.00	**9-1887-5**	61.00
24V 60 Hz	**T**	**9-1945-8**	④	**9-2650-7**	**9-2823-7**	61.00	**9-1887-7**	61.00
380V 50 Hz	**L**	**9-1945-6**	④	**9-2650-6**	**9-2421-18** ③	61.00	**9-1887-8**	61.00
120/240V 60 Hz or 110/220V 50 Hz	**F**	**—**	**—**	**—**	**—**	—	**9-1888-1**	61.00
240/480V 60 Hz or 220/440V 50 Hz	**G**	**—**	**—**	**—**	**—**	—	**9-1888-2**	61.00
277V 60 Hz	**H**	**9-1945-16**	④	**9-2650-13**	**9-2823-12**	61.00	**9-1887-16**	61.00
208/240V 60 Hz	**J**	**—**	**—**	**—**	**9-2823-17**	61.00	**—**	—
120V DC	**A1**	**—**	**—**	**—**	**—**		**9-2024-2**	138.00
240V DC	**B1**	**—**	**—**	**—**	**—**		**9-2024-1**	138.00
24V DC	**T1**	**—**	**—**	**—**	**—**		**9-2024-4**	138.00
48V DC	**W1**	**—**	**—**	**—**	**—**		**9-2024-3**	138.00
Replacement Thermal Elements								
Standard Trip Eutectic (12 teeth)		**10-4767**	**10-4767**	**10-4767**	**10-4767**	19.20	**10-4767**	19.20
Slow Trip Eutectic (24 teeth)		**10-5018**	**10-5018**	**10-5018**	**10-5018**	18.20	**10-5018**	18.20
Current Transformer		**—**	**—**	**—**	**—**	—	**—**	—

① For non-reversing contactors and starters only. For Size 00 reversing, select parts from adjoining size 0 column.
② Replace complete contactor.
③ Non-encasulated coil.
④ Obsolete.

Discount Symbol **1CD1C**

Table 33-257. Citation Renewal Parts (Continued)

Description		Size 1		Size 2				Size 3			
				Series A1		Series B1		Series A1		Series B1	
		Part Number	Price U.S. $	Part Number	Price U.S. $	Part Number	Price U.S. $	Part Number	Price U.S. $	Part Number	Price U.S. $
Set of Contacts											
Part Number on Contactor or Starter Nameplate											
2-Pole without Interlock		**6-23**	68.50	**6-24**	122.00	**6-34**	122.00	**6-25**	199.00	**6-35**	199.00
3-Pole without Interlock		**6-23-2**	102.00	**6-24-2**	182.00	**6-34-2**	182.00	**6-25-2**	299.00	**6-35-2**	299.00
3-Pole with Interlock		**—**	—	**—**	—	**—**	—	**—**	—	**—**	—
4-Pole without Interlock		**6-23-3**	135.00	**—**	—	**6-34-3**	242.00	**—**	—	**—**	—
5-Pole without Interlock		**6-23-4**	170.00	**—**	—	**6-34-4**	303.00	**—**	—	**—**	—
Magnet Coils	**Coil Suffix**										
120V 60 Hz or 110V 50 Hz	**A**	**9-1887-1**	61.00	**9-1889-1**	72.50	**9-2526-1**	72.50	**9-1891-1**	120.00	**9-1889-1**	72.50
240V 60 Hz or 220V 50 Hz	**B**	**9-1887-2**	61.00	**9-1889-2**	72.50	**9-2526-2**	72.50	**9-1891-2**	120.00	**9-1889-2**	72.50
480V 60 Hz or 440V 50 Hz	**C**	**9-1887-3**	61.00	**9-1889-3**	72.50	**9-2526-3**	72.50	**9-1891-3**	120.00	**9-1889-3**	72.50
600V 60 Hz or 550V 50 Hz	**D**	**9-1887-4**	61.00	**9-1889-4**	72.50	**9-2526-4**	72.50	**9-1891-4**	120.00	**9-1889-4**	72.50
208V 60 Hz	**E**	**9-1887-5**	61.00	**9-1889-13**	72.50	**9-2526-5**	72.50	**9-1891-13**	120.00	**9-1889-13**	72.50
24V 60 Hz	**T**	**9-1887-7**	61.00	**9-1889-20**	72.50	**9-2526-6**	72.50	**9-1891-15**	120.00	**9-1889-20**	72.50
380V 50 Hz	**L**	**9-1887-8**	61.00	**9-1889-14**	72.50	**9-2526-7**	72.50	**9-1891-14**	120.00	**9-1889-14**	72.50
120/240V 60 Hz or 110/220V 50 Hz	**F**	**9-1888-1**	61.00	**9-1890-1**	72.50	**9-2527-1**	72.50	**—**	—	**—**	—
240/480V 60 Hz or 220/440V 50 Hz	**G**	**9-1888-2**	61.00	**9-1890-2**	72.50	**9-2527-2**	72.50	**—**	—	**—**	—
277V 60 Hz	**H**	**9-1887-16**	61.00	**9-1889-31**	72.50	**9-2526-15**	72.50	**9-1891-26**	120.00	**9-1889-31**	72.50
120V DC	**A1**	**9-2024-2**	138.00	**9-2025-2**	173.00	**9-2626-2**	106.00	**9-2026-2**	220.00	**9-2025-2**	173.00
240V DC	**B1**	**9-2024-1**	138.00	**9-2025-1**	173.00	**9-2626-1**	106.00	**9-2026-1**	220.00	**9-2025-1**	173.00
24V DC	**T1**	**9-2024-4**	138.00	**9-2025-4**	173.00	**9-2626-4**	106.00	**9-2026-4**	220.00	**9-2025-4**	173.00
48V DC	**W1**	**9-2024-3**	138.00	**9-2025-3**	173.00	**9-2626-3**	106.00	**9-2026-3**	220.00	**9-2025-3**	173.00
Replacement Thermal Elements											
Standard Trip Eutectic (12 teeth)		**10-4767**	19.20	**10-4767**	19.20	**10-4767**	19.20	**10-4767**	19.20	**10-4767**	19.20
Slow Trip Eutectic (24 teeth)		**10-5018**	18.20	**10-5018**	18.20	**10-5018**	18.20	**10-5018**	18.20	**10-5018**	18.20
Current Transformer		**—**	—	**—**	—	**—**	—	**—**	—	**—**	—

Discount Symbol **1CD1C**

Table 33-257. Citation Renewal Parts (Continued)

Description		Size 4		Size 5		Size 6					
						Series A1		Series B1		Series C1	
		Part Number	Price U.S. $	Part Number	Price U.S. $	Part Number	Price U.S. $	Part Number	Price U.S. $	Part Number	Price U.S. $
Set of Contacts											
Part Number on Contactor or Starter Nameplate											
2-Pole without Interlock		**6-36-3** ⑤	417.00	**6-27**	760.00	**6-28**	1,805.00	**—**	—	**6-601-2**	1,910.00
3-Pole without Interlock		**6-36-4** ⑤	630.00	**6-27-2**	1,135.00	**6-28-2**	2,705.00	**6-570**	4,280.00	**6-601**	2,865.00
3-Pole with Interlock		**—**	—	**—**	—	**—**	—	**—**	—	**—**	—
4-Pole without Interlock		**—**	—	**—**	—	**—**	—	**—**	—	**—**	—
5-Pole without Interlock		**—**	—	**—**	—	**—**	—	**—**	—	**—**	—
Magnet Coils	**Coil Suffix**										
120V 60 Hz or 110V 50 Hz	**A**	**9-1891-1**	120.00	**9-1891-1**	120.00	**9-1875-1**	805.00	**9-2651**	1,110.00	**9-2698**	805.00
240V 60 Hz or 220V 50 Hz	**B**	**9-1891-2**	120.00	**9-1891-2**	120.00	**9-1875-2**	805.00	**9-2651-2**	1,110.00	**9-2698-2**	805.00
480V 60 Hz or 440V 50 Hz	**C**	**9-1891-3**	120.00	**9-1891-3**	120.00	**9-1875-3**	805.00	**9-2651-3**	1,110.00	**9-2698-3**	805.00
600V 60 Hz or 550V 50 Hz	**D**	**9-1891-4**	120.00	**9-1891-4**	120.00	**9-1875-4**	805.00	**9-2651-4**	1,110.00	**9-2698-4**	805.00
208V 60 Hz	**E**	**9-1891-13**	120.00	**9-1891-13**	120.00	**9-1875-14**	805.00	**9-2651-6**	1,110.00	**9-2698-5**	805.00
24V 60 Hz	**T**	**9-1891-15**	120.00	**9-1891-15**	120.00	**—**	—	**—**	—	**—**	—
380V 50 Hz	**L**	**9-1891-14**	120.00	**9-1891-14**	120.00	**—**	—	**9-2651-5**	1,110.00	**9-2698-6**	805.00
120/240V 60 Hz or 110/220V 50 Hz	**F**	**—**	—	**—**	—	**—**	—	**—**	—	**—**	—
240/480V 60 Hz or 220/440V 50 Hz	**G**	**—**	—	**—**	—	**—**	—	**—**	—	**—**	—
277V 60Hz	**H**	**9-1891-26**	120.00	**9-1891-26**	120.00	**—**	—	**—**	—	**—**	—
120V DC	**A1**	**9-2026-2**	220.00	**9-2026-2**	220.00	**—**	—	**—**	—	**—**	—
240V DC	**B1**	**9-2026-1**	220.00	**9-2026-1**	220.00	**—**	—	**—**	—	**—**	—
24V DC	**T1**	**9-2026-4**	220.00	**9-2026-4**	220.00	**—**	—	**—**	—	**—**	—
48V DC	**W1**	**9-2026-3**	220.00	**9-2026-3**	220.00	**—**	—	**—**	—	**—**	—
Replacement Thermal Elements											
Standard Trip Eutectic (12 teeth)		**10-4767**	19.20	**10-4767**	19.20	**10-4767**	19.20	**10-4767**	19.20	**10-4767**	19.20.
Slow Trip Eutectic (24 teeth)		**10-5018**	18.20	**10-5018**	18.20	**—**	—	**—**	—	**—**	—
Current Transformer		**—**	—	**—**	—	**—**	—	**—**	—	**—**	—

⑤ Series B1. For Series A1, order 6-26 or 6-26-2 (list price is the same).

Discount Symbol **1CD1C**

Table 33-257. Citation Renewal Parts (Continued)

Description		Size 7				Size 8	
		Series A1	Price U.S. $	Series B1	Price U.S. $		
		Part Number		Part Number		Part Number	Price U.S. $
Set of Contacts							
Part Number on Contactor or Starter Nameplate							
2-Pole without Interlock		**6-28**	1,805.00	**—**	—	**—**	—
3-Pole without Interlock		**6-28-2**	2,705.00	**6-570**	4,280.00	**6-571**	4,720.00
3-Pole with Interlock		**—**	—	**—**	—	**—**	—
4-Pole without Interlock		**—**	—	**—**	—	**—**	—
5-Pole without Interlock		**—**	—	**—**	—	**—**	—
Magnet Coils	**Coil Suffix**						
120V 60 Hz or 110V 50 Hz	**A**	**9-1875-1**	805.00	**9-2651**	1,110.00	**9-2654**	1,325.00
240V 60 Hz or 220V 50 Hz	**B**	**9-1875-2**	805.00	**9-2651-2**	1,110.00	**9-2654-2**	1,325.00
480V 60 Hz or 440V 50 Hz	**C**	**9-1875-3**	805.00	**9-2651-3**	1,110.00	**9-2654-3**	1,325.00
600V 60 Hz or 550V 50 Hz	**D**	**9-1875-4**	805.00	**9-2651-4**	1,110.00	**9-2654-4**	1,325.00
208V 60 Hz	**E**	**9-1875-14**	805.00	**9-2651-6**	1,110.00	**9-2654-6**	1,325.00
24V 60 Hz	**T**	**—**	—	**—**	—	**—**	—
380V 50 Hz	**L**	**—**	—	**9-2651-5**	1,110.00	**9-2654-5**	1,325.00
120/240V 60 Hz or 110/220V 50 Hz	**F**	**—**	—	**—**	—	**—**	—
240/480V 60 Hz or 220/440V 50 Hz	**G**	**—**	—	**—**	—	**—**	—
277V 60 Hz	**H**	**—**	—	**—**	—	**—**	—
120V DC	**A1**	**—**	—	**—**	—	**—**	—
240V DC	**B1**	**—**	—	**—**	—	**—**	—
24V DC	**T1**	**—**	—	**—**	—	**—**	—
48V DC	**W1**	**—**	—	**—**	—	**—**	—
Replacement Thermal Elements							
Standard Trip Eutectic (12 teeth)		**10-4767**	19.20	**10-4767**	19.20	**10-4767**	19.20
Slow Trip Eutectic (24 teeth)		**—**	—	**—**	—	**—**	—
Current Transformer		**—**	—	**—**	—	**—**	—

Discount Symbol **1CD1C**

For Type N Control

Table 33-258. Contact Kits

Poles	NEMA Size	Part Number	Price U.S. $
3	0	**1605 226**	274.
	1	**1605 212**	331.
	2	**1605 202**	376.
	3	**1625 563**	610.
	4	**1625 564**	1,035.

Table 33-259. AC Coils

Voltage	Hz	2-, 3-Pole			4-, 5-Pole		
		Obsolete Part Number	Current Part Number	Price U.S. $	Obsolete Part Number	Current Part Number	Price U.S. $
Size 0, 1 ①							
110	60	1470241	**9969D90G01**	285.	1470261	**9969D90G16**	285.
110/208/220	25/60/60	1470242	**9969D90G02**	285.	1470262	**9969D90G17**	285.
220/380/440	25/50/60	1470243	**9969D90G03**	285.	1470263	**9969D90G18**	285.
550	60	1470244	**9969D90G04**	285.	N/A	**N/A**	—
220	50	1470247	**9969D90G06**	285.	N/A	**N/A**	—
440	50	1470248	**9969D90G07**	285.	1470268	**9969D90G19**	285.
440	25	1470250	**9969D90G08**	285.	1470270	**9969D90G21**	285.
120	60	1605268	**9969D90G09**	285.	N/A	**N/A**	—
115/208/230	60/60/60	1605513	**9969D90G15**	285.	N/A	**N/A**	—
600	60	1470245	**9969D90G20**	285.	N/A	**N/A**	—
550	25	1470251	**9969D90G22**	285.	N/A	**N/A**	—
Size 2 ①							
110	60	1470201	**9969D92G01**	285.	1470221	**9969D93G01**	285.
110/208/220	25/60/60	1470202	**9969D92G02**	285.	1470222	**9969D93G02**	285.
220/380/440/480	25/50/60/60	1470203	**9969D92G03**	285.	N/A	**N/A**	—
550	60	1470204	**9969D92G04**	285.	1470224	**9969D93G10**	285.
110	50	1470206	**9969D92G05**	285.	1470226	**9969D93G05**	285.
220	50	1470207	**9969D92G06**	285.	1470227	**9969D93G06**	285.
440	50	1470208	**9969D92G07**	285.	1470228	**9969D93G07**	285.
600	60	1470205	**9969D92G08**	285.	1470225	**9969D93G08**	285.
440	25	1470210	**9969D92G09**	285.	N/A	**N/A**	—
120/110	60/50	1605478	**9969D92G10**	285.	N/A	**N/A**	—
550	50	1470209	**9969D92G11**	285.	N/A	**N/A**	—
415	50	N/A	**N/A**	—	L1557647	**9969D93G09**	285.
220/380/440	25/60/60	N/A	**N/A**	—	1470223	**9969D93G03**	285.
Size 3 ①							
110	60	1490645	**9969D96G04**	399.	1490645	**9969D96G04**	399.
110/208/220	25/60/60	1490646	**9969D96G05**	399.	1490646	**9969D96G05**	399.
220/380/400/440	25/50/50/60	1490647	**9969D96G06**	399.	1490647	**9969D96G06**	399.
110	50	1490652	**9969D96G08**	399.	1490652	**9969D96G08**	399.
120/110	60/50	1600770	**9969D96G09**	399.	1600770	**9969D96G09**	399.
600/500	60/50	1490649	**9969D96G21**	399.	1490649	**9969D96G21**	399.
600/500/400	60/50/40	1659421	**9969D96G23**	399.	1659421	**9969D96G23**	399.
220	50	1490653	**9969D93G24**	399.	1490653	**9969D93G24**	399.
240	60	1490648	**9969D96G29**	399.	1490648	**9969D96G29**	399.
Size 4							
110	60	1596633	**9969D96G10**	399.	1597723	**9969D96G01**	399.
110/208/220	25/60/60	1490658	**9969D96G11**	399.	1597724	**9969D96G02**	399.
110	50	1596636	**9969D96G13**	399.	N/A	**N/A**	—
220	50	1596637	**9969D96G14**	399.	N/A	**N/A**	—
240	50	1596639	**9969D96G15**	399.	N/A	**N/A**	—
600/500	60/50	1596635	**9969D96G16**	399.	1490649	**9969D96G21**	399.
440	25	1596641	**9969D96G17**	399.	N/A	**N/A**	—
600	60	1596634	**9969D93G19**	399.	N/A	**N/A**	—
440	60	1490659	**9969D96G12**	399.	N/A	**N/A**	—
120/110	60/50	1600771	**9969D96G20**	399.	N/A	**N/A**	—
220/380/400/440	25/50/50/60	N/A	**N/A**	—	1597725	**9969D96G31**	399.

① Minimum order quantity of 3 required.

Discount Symbol **1CD1C**

For Catalog Number A202 Lighting Contactors

Table 33-260. AC Coils — Magnetically Latched ①

Voltage	Hz	2-, 3-, 4-Pole		5-Pole	
		Part Number	Price U.S. $	Part Number	Price U.S. $
30 Ampere					
110/120	50/60	**7874A93G01**	101.	**7874A89G01**	101.
208/240	50/60	**7874A93G02**	101.	**7874A89G02**	101.
277	50/60	**7874A93G03**	101.	**7874A89G03**	101.
440/480	50/60	**7874A93G04**	101.	**7874A89G04**	101.
575	50/60	**7874A93G05**	101.	**7874A89G05**	101.
60 Ampere					
		2-, 3-Pole		4-, 5-Pole	
110/120	50/60	**7874A93G01**	101.	**7874A87G01**	101.
208/240	50/60	**7874A93G02**	101.	**7874A87G02**	101.
277	50/60	**7874A93G03**	101.	**7874A87G03**	101.
440/480	50/60	**7874A93G04**	101.	**7874A87G04**	101.
575	50/60	**7874A93G05**	101.	**7874A87G05**	101.
100 and 200 Ampere					
110/120	50/60	**7874A85G01**	202.	**7874A83G01**	202.
208/240	50/60	**7874A85G02**	202.	**7874A83G02**	202.
277	50/60	**7874A85G03**	202.	**7874A83G03**	202.
440/480	50/60	**7874A85G04**	202.	**7874A83G04**	202.
550/575	50/60	**7874A85G05**	202.	**7874A83G05**	202.

① All electrically held lighting contactor coils are identical to the A201 series coils. See **Pages 33-136 – 33-140**.

Table 33-261. Terminals (Line and Load)

2-Pole		3-Pole		4-Pole		5-Pole	
Part Number	Price U.S. $ ②	Part Number	Price U.S. $ ②	Part Number	Price U.S. $ ②	Part Number	Price U.S. $ ②
30 Ampere							
N/A		**N/A**		**N/A**		**N/A**	
60 Ampere							
179C755G17		**179C755G16**		**179C755G12** (2)		**179C755G16** **179C755G17**	
100 Ampere							
179C755G19		**179C755G18**		**179C755G19** (2)		**179C755G18** **179C755G19**	
200 Ampere Model K Electrically Held							
179C755G28		**179C755G27**		**179C755G28** (2)		**179C755G27** **179C755G28**	
200 Ampere Model J Magnetically Latched							
179C755G31		**179C755G30**		**179C755G31** (2)		**179C755G30** **179C755G31**	

② Consult factory for prices.

Table 33-262. Other Accessories

Description	Size	Part Number	Price U.S. $
Control Module (Rectifier)	30 – 200A	**3915B98G01**	134.

Arc boxes, upper and lower base assemblies and cross bars are equivalent to the A201 series. See **Pages 33-136 – 33-140**.

Contact kits are equivalent to the A201 Model J series, with the exception of the magnetically latched 200 ampere unit. It uses Catalog Number 672B788G07 for the 3-pole device. For other poles, consult factory.

Discount Symbol **1CD1C**

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AC Solenoids

Product Description **33-156**
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Product Selection **33-157**

Cat. No. 10370

Product Description

These solenoids are used for a wide variety of applications where straight line motion is to be obtained automatically or at a remote point.

Features

- Plunger and frame are machined to ensure quiet operation
- Push- and pull-type operation
- With and without terminal box
- Plunger provided with connecting pin
- Size C and D solenoids are provided with special bearing to minimize wear in clevis under severe service

Dimensions

Table 33-263. Approximate Dimensions in Inches (mm) and Shipping Weights

Size	Push Type						Pull Type					
	Dimensions in Inches (mm)					Ship. Wt. Lbs. (kg)	Dimensions in Inches (mm)					Ship. Wt. Lbs. (kg)
	Wide A	High B ①	Deep C	Mounting D	Mounting E		Wide A	High B ①	Deep C	Mounting D	Mounting E	
Wall Mounted												
A	2.38 (60.5)	3.63 (92.2)	2.25 (57.2)	1.13 (28.7)	1.63 (41.4)	2.0 (.9)	2.38 (60.5)	2.63 (66.8)	2.25 (57.2)	1.13 (28.7)	1.63 (41.4)	2.0 (.9)
B	2.63 (66.8)	4.88 (124.0)	3.00 (76.2)	2.00 (50.8)	2.13 (54.1)	2.5 (1.1)	2.63 (66.8)	3.63 (92.2)	3.00 (76.2)	2.00 (50.8)	2.13 (54.1)	2.5 (1.1)
C	3.00 (76.2)	6.13 (155.7)	4.13 (104.9)	2.38 (60.5)	3.13 (79.5)	5.0 (2.3)	3.00 (76.2)	4.88 (124.0)	4.13 (104.9)	2.38 (60.5)	3.13 (79.5)	5.0 (2.3)
D	4.00 (101.6)	6.13 (155.7)	4.13 (104.9)	2.75 (69.9)	3.13 (79.5)	7.0 (3.2)	4.00 (101.6)	4.88 (124.0)	4.13 (104.9)	2.75 (69.9)	3.13 (79.5)	7.0 (3.2)
Floor Mounted												
B	3.13 (79.5)	4.88 (124.0)	3.00 (76.2)	1.50 (38.1)	2.25 (57.2)	2.5 (1.1)	3.13 (79.5)	3.88 (98.6)	3.00 (76.2)	1.50 (38.1)	2.25 (57.2)	2.5 (1.1)
C	3.50 (88.9)	6.13 (155.7)	3.75 (95.3)	1.75 (44.5)	3.13 (79.5)	5.0 (2.3)	3.50 (88.9)	4.88 (124.0)	3.75 (95.3)	1.75 (44.5)	3.13 (79.5)	5.0 (2.3)
D	3.88 (98.6)	6.13 (155.7)	3.75 (95.3)	2.25 (57.2)	3.13 (79.5)	7.0 (3.2)	3.88 (98.6)	4.88 (124.0)	3.75 (95.3)	2.25 (57.2)	3.13 (79.5)	7.0 (3.2)

① In sealed state.

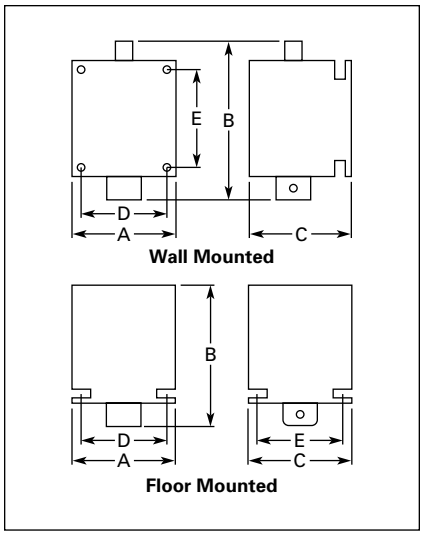

Figure 33-56. Approximate Dimensions

Product Selection

When Ordering Specify

■ Catalog Number

Table 33-264. AC Solenoids — 60 Hz, Continuous Duty

Size	Voltage	Operating Data ②													
		Magnetic Force in Lbs.						Max. Stroke in Inches (mm)	Current		Catalog Numbers				
		Horizontal Position		With Gravity		Against Gravity			Inrush	Sealed	Without Conduit Box			With Conduit Box	
		At 100% Voltage	At 85% Voltage	At 100% Voltage	At 85% Voltage	At 100% Voltage	At 85% Voltage				Floor Mtg.	Wall Mtg.	Price U.S.$	Mtg. ①	Price U.S.$
60 Hertz Pull Type															
A	110	.72	.50	.90	.68	.55	.33	1 (25.4)	1.83	.34	—	**10370H1**	154.	**10370H610**	179.
	220	.72	.50	.90	.68	.55	.33	1 (25.4)	.92	.17	—	**10370H2**	154.	**10370H611**	179.
	440	.72	.50	.90	.68	.55	.33	1 (25.4)	.45	.08	—	**10370H3**	154.	**10370H612**	179.
B	110	4.2	3	4.5	3.3	3.9	2.7	1 (25.4)	5.4	.87	**10370H57**	**10370H694**	226.	**10370H69**	251.
	220	4.2	3	4.5	3.3	3.9	2.7	1 (25.4)	2.6	.42	**10370H58**	**10370H696**	226.	**10370H70**	251.
	440	4.2	3	4.5	3.3	3.9	2.7	1 (25.4)	1.29	.20	**10370H59**	**10370H697**	226.	**10370H71**	251.
C	110	7	5.25	8	6.25	6	4.25	1.25 (31.8)	10.4	1.07	**10370H244**	—	257.	**10370H256**	282.
	220	7	5.25	8	6.25	6	4.25	1.25 (31.8)	5.2	.52	**10370H245**	—	257.	**10370H257**	282.
	440	7	5.25	8	6.25	6	4.25	1.25 (31.8)	2.5	.26	**10370H246**	—	257.	**10370H258**	282.
D	110	12.4	10	13.65	11.25	11.15	8.75	1.25 (31.8)	18	1.58	**10370H356**	**10370H814**	303.	**10370H368**	334.
	220	12.4	10	13.65	11.25	11.15	8.75	1.25 (31.8)	9.3	.81	**10370H357**	**10370H816**	303.	**10370H369**	334.
	440	12.4	10	13.65	11.25	11.15	8.75	1.25 (31.8)	4.4	.40	**10370H358**	**10370H817**	303.	**10370H370**	334.
60 Hertz Push Type															
A	110	.72	.50	.90	.68	.55	.33	1 (25.4)	1.83	.34	—	**10370H13**	179.	**10370H25**	207.
	220	.72	.50	.90	.68	.55	.33	1 (25.4)	.92	.17	—	**10370H14**	179.	**10370H26**	207.
	440	.72	.50	.90	.68	.55	.33	1 (25.4)	.45	.08	—	**10370H15**	179.	**10370H27**	207.
B	110	4.2	3	4.5	3.3	3.9	2.7	1 (25.4)	5.4	.87	**10370H81**	**10370H708**	251.	**10370H93**	282.
	220	4.2	3	4.5	3.3	3.9	2.7	1 (25.4)	2.6	.42	**10370H82**	**10370H710**	251.	**10370H94**	282.
	440	4.2	3	4.5	3.3	3.9	2.7	1 (25.4)	1.29	.20	**10370H83**	**10370H711**	251.	**10370H95**	282.
C	110	7	5.25	8	6.25	6	4.25	1.25 (31.8)	10.4	1.07	**10370H268**	—	282.	**10370H280**	311.
	220	7	5.25	8	6.25	6	4.25	1.25 (31.8)	5.2	.52	—	**10370H774**	282.	**10370H281**	311.
	440	7	5.25	8	6.25	6	4.25	1.25 (31.8)	2.5	.26	—	**10370H775**	282.	**10370H282**	311.
D	110	12.4	10	13.65	11.25	11.15	8.75	1.25 (31.8)	18	1.58	**10370H380**	**10370H828**	334.	**10370H392**	364.
	220	12.4	10	13.65	11.25	11.15	8.75	1.25 (31.8)	9.3	.81	**10370H381**	**10370H830**	334.	**10370H393**	364.
	440	12.4	10	13.65	11.25	11.15	8.75	1.25 (31.8)	4.4	.40	**10370H382**	**10370H831**	334.	**10370H394**	364.

① Recommended selection of solenoids on basis of 85% voltage values.

② Mounting of solenoids "with conduit box" — Size A are for wall mounting — Size B, C and D are for floor mounting.

Discount Symbol **1CD1C**

Contents

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AC and DC Magnetic Shoe Brakes

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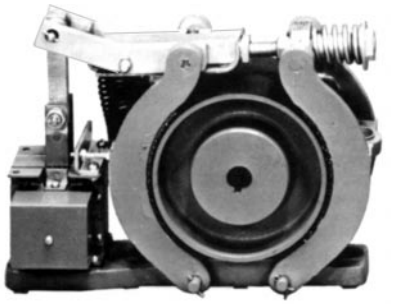


Size S-7 Brake and Wheel

Product Description

Cutler-Hammer Type S brakes are electrically released and spring applied providing "fail-safe" operation. The retarding torque developed is directly proportional to the spring pressure.

Application Description

- Conveyors
- Machine tools
- Printing presses
- Small cranes
- Overhead doors
- Dumb waiters
- Vacuum molding machines
- Carnival rides

Features

The brake wheel is of relatively large size in relation to the torque developed by the brake. This permits use of a larger brake shoe lining and lower shoe pressures. Low shoe pressure, equally distributed over a large lining area, results in even wear of the friction surfaces and even braking torque. The oversize wheel type construction also permits use of a smaller operating solenoid that requires less current for a given torque rating.

Brake Selection

The method most generally used to determine required braking torque is to calculate the full load motor torque by the following formula:

$$T = \frac{5252 \times hp}{rpm}$$

T = Full load motor torque in lb-ft
hp = Motor horsepower
rpm = Speed of shaft on which brake wheel is mounted

The torque rating of the brake selected should be at least equal to the full load motor torque for the duty considered.

DC Brakes

Standard DC brakes are equipped with shunt coils. The magnet coil circuit on DC brakes consists of two separate windings and a protective switch.

Mounting

Type S brakes are designed and recommended for use and mounting only in the horizontal position. Side or vertical mountings are not recommended because the solenoid loading is altered, resulting in accelerated wear and premature coil failure.

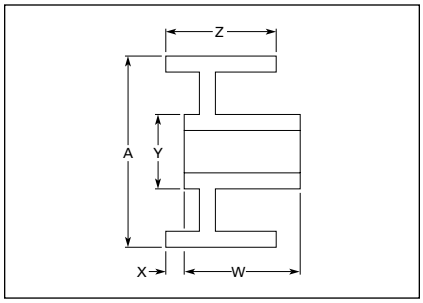


Figure 33-57. Standard Brake Wheels — Approximate Dimensions

Table 33-265. Standard Brake Wheel Dimensions

Approximate Dimensions in Inches (mm)					Bore	
A	Z	W ①	X	Y	Max.	Min.
4.00 (101.6)	2.75 (69.9)	1.63 (41.4)	1.38 (35.1)	2.50 (63.5)	1.38 (35.1)	.50 (12.7)
5.50 (139.7)	3.25 (82.6)	2.00 (50.8)	1.63 (41.4)	3.25 (82.6)	2.00 (50.8)	.75 (19.1)
7.00 (177.8)	4.25 (108.0)	3.00 (76.2)	1.25 (31.8)	4.00 (101.6)	2.25 (57.2)	1.00 (25.4)
10.00 (254.0)	4.25 (108.0)	3.25 (82.6)	1.25 (31.8)	4.88 (124.0)	2.88 (73.2)	1.38 (35.1)

① Hub lengths other than standard are not available.

Shipping Weights

Table 33-266. Approximate Shipping Weights

Brake Size	Torque Rating ft-lb	Weight in Lbs. (kg)		
		Net — Brake with Wheel	Net — Wheel Only	Boxed — Brake with Wheel
Type "S" AC Shoe Brakes				
S-4	3	15.8 (7.2)	3.4 (1.5)	17.0 (7.7)
S-4	10	15.8 (7.2)	3.4 (1.5)	17.0 (7.7)
S-4	15	15.8 (7.2)	3.4 (1.5)	17.0 (7.7)
S-5-1/2	25	33.2 (15.1)	7.5 (3.4)	36.0 (16.3)
S-5-1/2	35	33.2 (15.1)	7.5 (3.4)	36.0 (16.3)
S-7	50	52.1 (23.7)	18.8 (8.5)	55.0 (25.0)
S-7	75	52.1 (23.7)	18.8 (8.5)	55.0 (25.0)
S-10	125, 160	200.0 (90.8)	38.5 (17.3)	225.0 (102.2)
Type "S" DC Shoe Brakes				
S-4	3	18.0 (8.2)	3.4 (1.5)	20.0 (9.1)
S-4	10	18.0 (8.2)	3.4 (1.5)	20.0 (9.1)
S-4	15	18.0 (8.2)	3.4 (1.5)	20.0 (9.1)
S-5-1/2	25	35.0 (15.9)	7.5 (3.4)	38.0 (17.3)
S-5-1/2	35	35.0 (15.9)	7.5 (3.4)	38.0 (17.3)
S-7	50	54.0 (24.5)	18.8 (8.5)	58.0 (26.3)
S-7	75	54.0 (24.5)	18.8 (8.5)	58.0 (26.3)
S-7	85	54.0 (24.5)	18.8 (8.5)	58.0 (26.3)
S-7	110	54.0 (24.5)	18.8 (8.5)	58.0 (26.3)

Dimensions

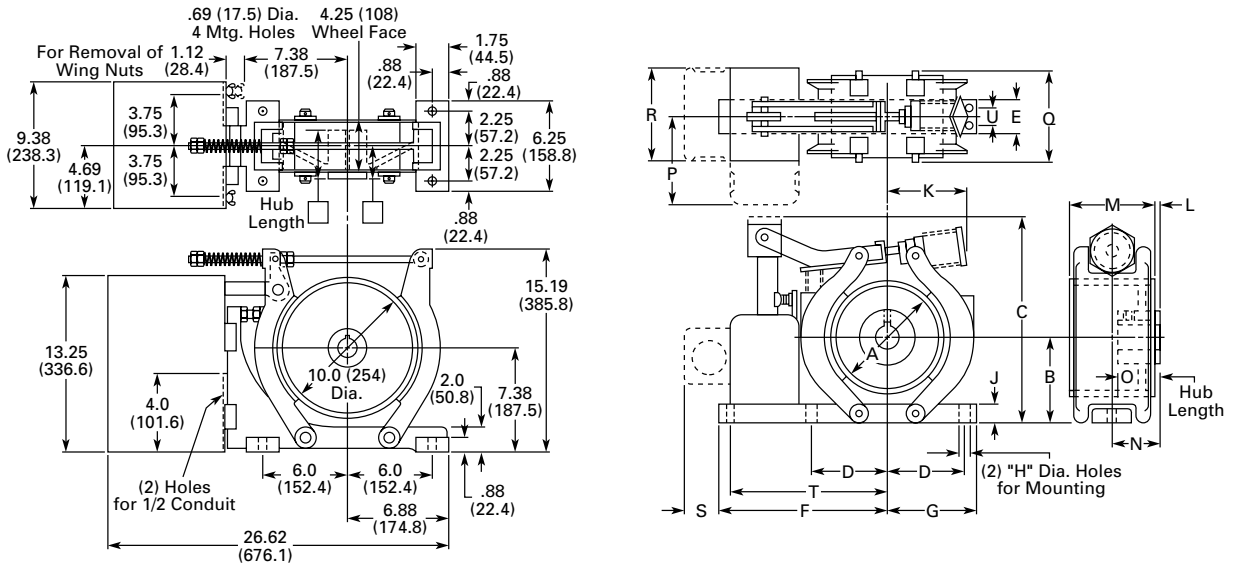
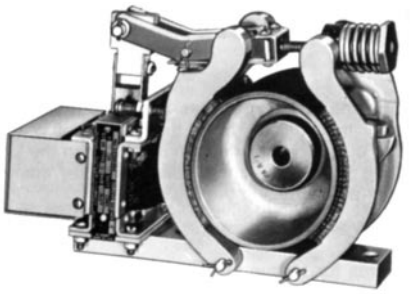


Figure 33-58. Approximate Dimensions in Inches (mm)

Table 33-267. Approximate Dimensions

Brake Size	Torque Rating ft-lb	Dimensions in Inches (mm)																	
		A	B ①	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R
Type "S" AC Shoe Brakes																			
S-4	3	4.00 (101.6)	2.88 (73.2)	7.50 (190.5)	2.63 (66.8)	1.25 (31.8)	7.50 (190.5)	3.13 (79.5)	.38 (9.7)	.63 (16.0)	2.88 (73.2)	.25 (6.4)	2.75 (69.9)	1.63 (41.4)	1.63 (41.4)	2.88 (73.2)	3.00 (76.2)	3.13 (79.5)
S-4	10	4.00 (101.6)	2.88 (73.2)	7.50 (190.5)	2.63 (66.8)	1.25 (31.8)	7.50 (190.5)	3.13 (79.5)	.38 (9.7)	.63 (16.0)	2.88 (73.2)	.25 (6.4)	2.75 (69.9)	1.63 (41.4)	1.63 (41.4)	2.88 (73.2)	3.00 (76.2)	3.13 (79.5)
S-4	15	4.00 (101.6)	2.88 (73.2)	7.50 (190.5)	2.63 (66.8)	1.25 (31.8)	7.50 (190.5)	3.13 (79.5)	.38 (9.7)	.63 (16.0)	2.88 (73.2)	.25 (6.4)	2.75 (69.9)	1.63 (41.4)	1.63 (41.4)	2.88 (73.2)	3.00 (76.2)	3.13 (79.5)
S-5-1/2	25	5.50 (139.7)	4.00 (101.6)	9.50 (241.3)	3.50 (88.9)	2.00 (50.8)	8.38 (212.9)	4.13 (104.9)	.44 (11.2)	1.00 (25.4)	4.88 (124.0)	.38 (9.7)	3.25 (82.6)	2.00 (50.8)	2.00 (50.8)	3.13 (79.5)	3.75 (95.3)	3.13 (79.5)
S-5-1/2	35	5.50 (139.7)	4.00 (101.6)	9.50 (241.3)	3.50 (88.9)	2.00 (50.8)	8.38 (212.9)	4.13 (104.9)	.44 (11.2)	1.00 (25.4)	7.88 (200.2)	.38 (9.7)	3.25 (82.6)	2.00 (50.8)	2.00 (50.8)	3.13 (79.5)	3.75 (95.3)	3.13 (79.5)
S-7	50	7.00 (177.8)	5.00 (127.0)	11.50 (292.1)	4.38 (111.3)	2.50 (63.5)	9.50 (241.3)	5.00 (127.0)	.56 (14.2)	1.00 (25.4)	6.00 (152.4)	—	4.25 (108.0)	2.13 (54.1)	3.00 (76.2)	3.13 (79.5)	4.75 (120.7)	3.13 (79.5)
S-7	75	7.00 (177.8)	5.00 (127.0)	11.50 (292.1)	4.38 (111.3)	2.50 (63.5)	9.50 (241.3)	5.00 (127.0)	.56 (14.2)	1.00 (25.4)	6.00 (152.4)	—	4.25 (108.0)	2.13 (54.1)	3.00 (76.2)	3.13 (79.5)	4.75 (120.7)	3.13 (79.5)
S-10	125, 160	Refer to above drawing.																
Type "S" DC Shoe Brakes																		
S-4	3	4.00 (101.6)	3.50 (88.9)	8.00 (203.2)	2.63 (66.8)	1.25 (31.8)	7.56 (192.0)	3.25 (82.6)	.38 (9.7)	.75 (19.1)	2.88 (73.2)	.25 (6.4)	2.75 (69.9)	1.63 (41.4)	1.63 (41.4)	2.63 (66.8)	3.00 (76.2)	4.06 (103.1)
S-4	10	4.00 (101.6)	3.50 (88.9)	8.00 (203.2)	2.63 (66.8)	1.25 (31.8)	7.56 (192.0)	3.25 (82.6)	.38 (9.7)	.75 (19.1)	2.88 (73.2)	.25 (6.4)	2.75 (69.9)	1.63 (41.4)	1.63 (41.4)	2.63 (66.8)	3.00 (76.2)	4.06 (103.1)
S-4	15	4.00 (101.6)	3.50 (88.9)	8.00 (203.2)	2.63 (66.8)	1.25 (31.8)	7.56 (192.0)	3.25 (82.6)	.38 (9.7)	.75 (19.1)	2.88 (73.2)	.25 (6.4)	2.75 (69.9)	1.63 (41.4)	1.63 (41.4)	2.63 (66.8)	3.00 (76.2)	4.06 (103.1)
S-5-1/2	25	5.50 (139.7)	4.00 (101.6)	9.50 (241.3)	3.50 (88.9)	2.00 (50.8)	8.38 (212.9)	4.13 (104.9)	.44 (11.2)	.75 (19.1)	4.88 (124.0)	.38 (9.7)	3.25 (82.6)	2.00 (50.8)	2.00 (50.8)	2.88 (73.2)	3.75 (95.3)	4.06 (103.1)
S-5-1/2	35	5.50 (139.7)	4.00 (101.6)	9.50 (241.3)	3.50 (88.9)	2.00 (50.8)	8.38 (212.9)	4.13 (104.9)	.44 (11.2)	.75 (19.1)	4.88 (124.0)	.38 (9.7)	3.25 (82.6)	2.00 (50.8)	2.00 (50.8)	2.88 (73.2)	3.75 (95.3)	4.06 (103.1)
S-7	50	7.00 (177.8)	5.00 (127.0)	11.50 (292.1)	4.38 (111.3)	2.50 (63.5)	9.50 (241.3)	5.00 (127.0)	.56 (14.2)	.75 (19.1)	6.00 (152.4)	—	4.25 (108.0)	2.13 (54.1)	3.00 (76.2)	2.88 (73.2)	4.88 (124.0)	4.06 (103.1)
S-7	75	7.00 (177.8)	5.00 (127.0)	11.50 (292.1)	4.38 (111.3)	2.50 (63.5)	9.50 (241.3)	5.00 (127.0)	.56 (14.2)	.75 (19.1)	6.00 (152.4)	—	4.25 (108.0)	2.13 (54.1)	3.00 (76.2)	2.88 (73.2)	4.88 (124.0)	4.06 (103.1)
S-7	85	7.00 (177.8)	5.00 (127.0)	11.50 (292.1)	4.38 (111.3)	2.50 (63.5)	9.50 (241.3)	5.00 (127.0)	.56 (14.2)	.75 (19.1)	6.00 (152.4)	—	4.25 (108.0)	2.13 (54.1)	3.00 (76.2)	2.88 (73.2)	4.88 (124.0)	4.06 (103.1)
S-7	110	7.00 (177.8)	5.00 (127.0)	11.50 (292.1)	4.38 (111.3)	2.50 (63.5)	9.50 (241.3)	5.00 (127.0)	.56 (14.2)	.75 (19.1)	6.00 (152.4)	—	4.25 (108.0)	2.13 (54.1)	3.00 (76.2)	2.88 (73.2)	4.88 (124.0)	4.06 (103.1)

① Open type brake only.



Size S-4 Brake and Wheel

Product Selection

When Ordering Specify

- Brake
  - Catalog Number plus Suffix Number for coil
  - Example: 511H1193-**41**
- Wheel
  - Catalog Number plus Suffix Number for bore size
  - Example: 511H1150-**3**
- Enclosure
  - Catalog Number
  - Example: 511ED50

Table 33-268. Type S Brakes — Floor Mounting

Torque — lb-ft		Brake Size	AC				DC			
Continuous	Intermittent ①		Base Catalog Number ②③	Price U.S. $	For Type S4, S5-1/2, S7, S10		Base Catalog Number ②③	Price U.S. $	Coil Voltage	Coil Suffix ②
					Coil Volts and Hertz	Coil Suffix ②				
3	3	S-4	**511H1194**	820.	120V 60 Hz	**-39**	**511H955**	1,100.	120V DC	**-97**
10	10	S-4	**511H1193**	820.	208V 60 Hz	**-45**	**511H956**	1,100.	240V DC	**-98**
—	15	S-4	**511H1192**	820.	240V 60 Hz	**-40**	**511H957**	1,100.		
25	25	S-5-1/2	**511H992**	1,030.	480V 60 Hz	**-41**	**511H994**	1,305.		
—	35	S-5-1/2	**511H993**	1,030.	600V 60 Hz	**-58**	**511H995**	1,305.		
50	50	S-7	**511H970**	1,640.	110V 50 Hz	**-5**	**511H975**	1,790.		
—	75	S-7	**511H971**	1,640.	220V 50 Hz	**-6**	**511H976**	1,790.		
85	85	S-7	**511H1195**	2,740.	380V 50 Hz	**-7**	**511H1197**	2,895.		
—	110	S-7	**511H1196**	2,740.	400V 50 Hz	**-8**	**511H1198**	2,895.		
125	125	S-10	**511H996**	6,650.	550V 50 Hz	**-9**	—	—		
—	160	S-10	**511H997**	6,650.			—	—		

① Intermittent duty indicates that the coil can be placed across the line continuously for one hour maximum without excessive heating. It is equivalent to 1/2 time ON and 1/2 time OFF.
② Add Suffix Number for coil voltage to Base Catalog Number.
③ Does not include Wheel.

Table 33-269. Enclosures Only

Brake Size	NEMA 2 – 3R ④ Dripproof, Rainproof and Sleet Resistant	
	Catalog Number	Price U.S. $
S-4	**511ED50**	535.
S-5-1/2	**511ED51**	575.
S-7	**511ED52**	620.

④ Can be mounted either right or left hand.

Discount Symbol **1CD1C**

Table 33-270. Brake Wheels

Wheel Size in Inches	Min. Bore in Inches (mm)	Max. Bore in Inches (mm)	Pilot Bore in Inches (mm)	WK^2	Straight Bore ③			Tapered Bore ①		
					Base ② Catalog Number	Finished Bore Price U.S. $	Pilot Bore Only Price U.S. $	Base ② Catalog Number	Finished Bore Price U.S. $	Pilot Bore Only Price U.S. $
4.0	.50 (12.7)	1.38 (35.1)	.50 (12.7)	.06	**511H1150**	207.	193.	**511H1151**	414.	390.
5.5	.75 (19.1)	2.00 (50.8)	.75 (19.1)	.26	**511H1160**	311.	287.	**511H1161**	585.	535.
7.0	1.00 (25.4)	2.25 (57.2)	.75 (19.1)	.77	**511H1170**	467.	426.	**511H1171**	775.	705.
10.0	1.38 (35.1)	2.88 (73.2)	1.13 (28.7)	3.10	**511H1190**	1,030.	930.	**511H1191**	1,395.	1,260.

① Taper is at rate of 1.25 inches per foot on diameter. In bore size selection, use diameter of tapered shaft. Bore tolerance: +.000 -.005 inches.
② Add Suffix Number for bore size to Base Catalog Number.
③ Bore tolerance: +.000 -.001 inches.

Table 33-271. Brake Wheel Suffix Numbers

Bore Size Suffix Number — Add to Base Catalog Number					
Bore ④ in Inches (mm)	Keyway in Inches	Suffix Number	Bore ④ in Inches (mm)	Keyway in Inches (mm)	Suffix Number
Standard Bore Sizes — No Price Addition					
Pilot Bore	None	**-1**	1.625 (41.28)	3/38 x 3/16	**-9**
.625 (15.88)	3/16 x 3/32	**-2**	1.875 (47.63)	1/2 x 1/4	**-10**
.750 (19.05)	3/16 x 3/32	**-3**	2.125 (53.98)	1/2 x 1/4	**-11**
.875 (22.23)	3/16 x 3/32	**-4**	2.375 (60.33)	5/8 x 5/16	**-12**
1.000 (25.40)	1/4 x 1/8	**-5**	2.500 (63.50)	5/8 x 5/16	**-63**
1.125 (28.58)	1/4 x 1/8	**-6**	2.625 (66.68)	5/8 x 5/16	**-13**
1.250 (31.75)	1/4 x 1/8	**-7**	2.750 (69.85)	5/8 x 5/16	**-18**
1.375 (34.93)	5/16 x 5/32	**-8**	2.875 (73.03)	3/4 x 3/8	**-14**
Non-standard Bore Sizes — Make Necessary Price Addition ⑤					
.500 (12.70)	1/8 x 1/16	**-50**	1.687 (42.85)	3/8 x 3/16	**-58**
.750 (19.05)	1/4 x 1/8	**-51**	1.750 (44.45)	3/8 x 3/16	**-59**
.875 (22.23)	1/4 x 1/8	**-52**	1.937 (49.20)	1/2 x 1/4	**-60**
1.000 (25.40)	5/16 x 5/32	**-53**	2.000 (50.80)	1/2 x 1/4	**-61**
1.187 (30.15)	1/4 x 1/8	**-54**	2.250 (57.15)	1/2 x 1/4	**-62**
1.375 (34.93)	3/8 x 3/16	**-55**	—	—	**—**
1.437 (36.50)	3/8 x 3/16	**-56**	—	—	**—**
1.500 (38.10)	3/8 x 3/16	**-57**	—	—	**—**

④ Bore size selected must be between minimum and maximum dimensions listed in brake wheel selection table.
⑤ Price Additions

Description	Adder U.S. $
4.0 Inch (101.6 mm)	64.
5.5 Inch (139.7 mm)	84.
7.0 Inch (177.8 mm)	111.
10.0 Inch (254.0 mm)	171.

Discount Symbol **1CD1C**

Ampacities of Insulated Conductors (Based on 1996 NEC ①)

Table 310-16. **Allowable Ampacities of Insulated Conductors Rated 0 – 2000V, 60° – 90°C (140° – 194°F), Not More Than Three Current-Carrying Conductors in Raceway or Cable or Earth (Directly Buried), Based on Ambient Temperature of 30°C (86°F)**

Size	Temperature Rating of Conductor. See NEC Table 310-13.						Size
AWG kcmil	60°C (140°F)	75°C (167°F)	90°C (194°F)	60°C (140°F)	75°C (167°F)	90°C (194°F)	AWG kcmil
	Types TW†, UF†	Types FEPW†, RH†, RHW†, THHW†, THW†, THWN†, XHHW†, USE†, ZW†	Types TBS, SA, SIS, FEP†, FEPB†, MI, RHH†, RHW-2, THHN†, THHW†, THW-2†, THWN-2†, USE-2, XHH, XHHW†, XHHW-2, ZW-2	Types TW†, UF†	Types RH†, RHW†, THHW†, THW†, THWN†, XHHW†, USE†	Types TBS, SA, SIS, THHN†, THHW†, THW-2, THWN-2, RHH†, RHW-2, USE-2, XHH, XHHW, XHHW-2, ZW-2	
	Copper			Aluminum or Copper-Clad Aluminum			
18	—	—	14	—	—	—	—
16	—	—	18	—	—	—	—
14	20†	20†	25†	—	—	—	—
12	25†	25†	30†	20†	20†	25†	12
10	30	35†	40†	25	30†	35†	10
8	40	50	55	30	40	45	8
6	55	65	75	40	50	60	6
4	70	85	95	55	65	75	4
3	85	100	110	65	75	85	3
2	95	115	130	75	90	100	2
1	110	130	150	85	100	115	1
1/0	125	150	170	100	120	135	1/0
2/0	145	175	195	115	135	150	2/0
3/0	165	200	225	130	155	175	3/0
4/0	195	230	260	150	180	205	4/0
250	215	255	290	170	205	230	250
300	240	285	320	190	230	255	300
350	260	310	350	210	250	280	350
400	280	335	380	225	270	305	400
500	320	380	430	260	310	350	500
600	355	420	475	285	340	385	600
700	385	460	520	310	375	420	700
750	400	475	535	320	385	435	750
800	410	490	555	330	395	450	800
900	435	520	585	355	425	480	900
1000	455	545	615	375	445	500	1000
1250	495	590	665	405	485	545	1250
1500	520	625	705	435	520	585	1500
1750	545	650	735	455	545	615	1750
2000	560	665	750	470	560	630	2000

Correction Factors

Ambient Temp. °C	For Ambient Temperatures Other Than 30°C (86°F), Multiply the Allowable Ampacities Shown Above by the Appropriate Factor Shown Below						Ambient Temp. °F
21 – 25	1.08	1.05	1.04	1.08	1.05	1.04	70 – 77
26 – 30	1.00	1.00	1.00	1.00	1.00	1.00	78 – 86
31 – 35	.91	.94	.96	.91	.94	.96	87 – 95
36 – 40	.82	.88	.91	.82	.88	.91	96 – 104
41 – 45	.71	.82	.87	.71	.82	.87	105 – 113
46 – 50	.58	.75	.82	.58	.75	.82	114 – 122
51 – 55	.41	.67	.76	.41	.67	.76	123 – 131
56 – 60	—	.58	.71	—	.58	.71	132 – 140
61 – 70	—	.33	.58	—	.33	.58	141 – 158
71 – 80	—	—	.41	—	—	.41	159 – 176

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† Unless otherwise specifically permitted elsewhere in this *Code*, the overcurrent protection for conductor types marked with an obelisk (†) shall not exceed 15A for No. 14, 20A for No. 12 and 30A for No. 10 copper; or 15A for No. 12 and 25A for No. 10 aluminum and copper-clad aluminum after any correction factors for ambient temperature and number of conductors have been applied.

Notes to Tables 310-16, 310-18

1. 120/240V, 3-Wire, Single-Phase Dwelling Services and Feeders. For dwelling units, conductors, as listed below, shall be permitted to be utilized as 120/240V, 3-wire, single-phase service-entrance conductors, service lateral conductors and feeder conductors that serve as the main power feeder to a dwelling unit and are installed in raceway or cable with or without an equipment grounding conductor. For applications of this note, the feeder conductors to a dwelling unit shall not be required to be larger than its service-entrance conductors. The grounded conductor shall be permitted to be smaller than the ungrounded conductors, provided the requirements of Sections 215-2, 220-22 and 230-42 are met.

Conductor Types and Sizes RH-RHH-RHW-THHW-THW-THWN-THHN-XHHW-USE

Copper	Aluminum or Copper-Clad Aluminum	Service or Feeder Rating in Amps
AWG	AWG	
4	2	100
3	1	110
2	1/0	125
1	2/0	150
1/0	3/0	175
2/0	4/0	200
3/0	250 kcmil	225
4/0	300 kcmil	250
250 kcmil	350 kcmil	300
350 kcmil	500 kcmil	350
400 kcmil	600 kcmil	400

8. Adjustment Factors.

(a) More Than Three Current-Carrying Conductors in a Raceway or Cable. Where the number of current-carrying conductors in a raceway or cable exceeds three, the allowable ampacities shall be reduced as shown in the following table:

Number of Current-Carrying Conductors	Percent of Values in Tables as Adjusted for Ambient Temperature if Necessary
4 – 6	80
7 – 9	70
10 – 20	50
21 – 30	45
31 – 40	40
41 and above	35

Where single conductors or multiconductor cables are stacked or bundled longer than 24 in. (610 mm) without maintaining spacing and are not installed in raceways, the allowable ampacity of each conductor shall be reduced as shown in the above table.

Ampacities of Insulated Conductors (Based on 1996 NEC ①) — Continued

Table 310-18. **Allowable Ampacities of Three Single Insulated Conductors Rated 0 – 2000V, 150° – 250°C (302° – 482°F), in Raceway or Cable Based on Ambient Air Temperature of 40°C (104°F)**

Size	Temperature Rating of Conductor. See NEC Table 310-13.				Size
AWG kcmil	150°C (302°F)	200°C (392°F)	250°C (482°F)	150°C (302°F)	AWG kcmil
	Type Z	Types FEP, FEPB, PFA	Types PFAH, TFE	Type Z	
	Copper		Nickel or Nickel-Coated Copper	Aluminum or Copper-Clad Aluminum	
14	34	36	39	—	14
12	43	45	54	30	12
10	55	60	73	44	10
8	76	83	93	57	8
6	96	110	117	75	6
4	120	125	148	94	4
3	143	152	166	109	3
2	160	171	191	124	2
1	186	197	215	145	1
1/0	215	229	244	169	1/0
2/0	251	260	273	198	2/0
3/0	288	297	308	227	3/0
4/0	332	346	361	260	4/0
250	—	—	—	—	250
300	—	—	—	—	300
350	—	—	—	—	350
400	—	—	—	—	400
500	—	—	—	—	500
600	—	—	—	—	600
700	—	—	—	—	700
750	—	—	—	—	750
800	—	—	—	—	800
1000	—	—	—	—	1000
1500	—	—	—	—	1500
2000	—	—	—	—	2000

Correction Factors

Ambient Temp. °C	For Ambient Temperatures Other Than 40°C (104°F), Multiply the Allowable Ampacities Shown Above By the Appropriate Factor Shown Below				Ambient Temp. °F
41 – 50	.95	.97	.98	.95	105 – 122
51 – 60	.90	.94	.95	.90	123 – 140
61 – 70	.85	.90	.93	.85	141 – 158
71 – 80	.80	.87	.90	.80	159 – 176
81 – 90	.74	.83	.87	.74	177 – 194
91 – 100	.67	.79	.85	.67	195 – 212
101 – 120	.52	.71	.79	.52	213 – 248
121 – 140	.30	.61	.72	.30	249 – 284
141 – 160	—	.50	.65	—	285 – 320
161 – 180	—	.35	.58	—	321 – 356
181 – 200	—	—	.49	—	357 – 392
201 – 225	—	—	.35	—	393 – 437

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Notes to Tables 310-16, 310-18 — Continued

8. Adjustment Factors. (continued)

Exception No. 1

Where conductors of different systems, as provided in Section 300-3, are installed on a common raceway or cable, the derating factors shown shall apply to the number of power and lighting (Articles 210, 215, 220 and 230) conductors only.

Exception No. 2

For conductors installed in cable trays, the provisions of Section 318-11 shall apply.

Exception No. 3

Derating factors shall not apply to conductors in nipples having a length not exceeding 24 in. (610 mm).

Exception No. 4

Derating factors shall not apply to underground conductors entering or leaving an outdoor trench if those conductors have physical protection in the form of rigid metal conduit, intermediate metal conduit, or rigid nonmetallic conduit having a length not exceeding 10 ft. (3.05m) and the number of conductors does not exceed four.

Exception No. 5.

For other loading conditions, adjustment factors and ampacities shall be permitted to be calculated under Section 310-15(b).

(FPN): See Appendix B, Table B-310-11, for adjustment factors for more than three current-carrying conductors in a raceway or cable with load diversity.

(b) More Than One Conduit, Tube or Raceway. Spacing between conduits, tubing or raceways shall be maintained.

9. Overcurrent Protection. Where the standard ratings and settings of overcurrent devices do not correspond with the ratings and settings allowed for conductors, the next higher standard rating and setting shall be permitted.

Exception: As limited in Section 240-3.

10. Neutral Conductor.

(a) A neutral conductor that carries only the unbalanced current from other conductors of the same circuit need not be counted when applying the provisions of Note 8.

(b) In a 3-wire circuit consisting of two phase wires and the neutral of a 4-wire, 3-phase wye-connected system, a common conductor carries approximately the same current as the line-to-neutral load currents of the other conductors and shall be counted when applying the provisions of Note 8.

(c) On a 4-wire, 3-phase wye circuit where the major portion of the load consists of nonlinear loads, there are harmonic currents present in the neutral conductor, and the neutral shall be considered to be a current-carrying conductor.

11. Grounding or Bonding Conductor. A grounding or bonding conductor shall not be counted when applying the provisions of Note 8.

Ampere Rating of AC and DC Motors

Ampere ratings of motors vary somewhat, depending upon the type of motor. The values given below are for drip-proof, Class B insulated (T Frame) where available, 1.15 service factor, NEMA Design B motors. These values represent an average full load motor current which was calculated from the motor performance data published by several motor manufacturers. In the case of high torque squirrel cage motors, the ampere ratings will be at least 10% greater than the values given below.

Caution — These average ratings could be high or low for a specific motor and therefore heater coil selection on this basis always involves risk. For fully reliable motor protection, select heater coils on the basis of full load current rating as shown on the motor nameplate.

Ampere Ratings of Three-Phase, 60 Hz, AC Induction Motor

hp	Syn. Speed RPM	Current in Amperes					
		200V	230V	380V ①	460V	575V	2200V
1/4	1800	1.09	.95	.55	.48	.38	—
	1200	1.61	1.40	.81	.70	.56	—
	900	1.84	1.60	.93	.80	.64	—
1/3	1800	1.37	1.19	.69	.60	.48	—
	1200	1.83	1.59	.92	.80	.64	—
	900	2.07	1.80	1.04	.90	.72	—
1/2	1800	1.98	1.72	.99	.86	.69	—
	1200	2.47	2.15	1.24	1.08	.86	—
	900	2.74	2.38	1.38	1.19	.95	—
3/4	1800	2.83	2.46	1.42	1.23	.98	—
	1200	3.36	2.92	1.69	1.46	1.17	—
	900	3.75	3.26	1.88	1.63	1.30	—
1	3600	3.22	2.80	1.70	1.40	1.12	—
	1800	4.09	3.56	2.06	1.78	1.42	—
	1200	4.32	3.76	2.28	1.88	1.50	—
	900	4.95	4.30	2.60	2.15	1.72	—
1-1/2	3600	5.01	4.36	2.64	2.18	1.74	—
	1800	5.59	4.86	2.94	2.43	1.94	—
	1200	6.07	5.28	3.20	2.64	2.11	—
	900	6.44	5.60	3.39	2.80	2.24	—
2	3600	6.44	5.60	3.39	2.80	2.24	—
	1800	7.36	6.40	3.87	3.20	2.56	—
	1200	7.87	6.84	4.14	3.42	2.74	—
	900	9.09	7.90	4.77	3.95	3.16	—
3	3600	9.59	8.34	5.02	4.17	3.34	—
	1800	10.8	9.40	5.70	4.70	3.76	—
	1200	11.7	10.2	6.20	5.12	4.10	—
	900	13.1	11.4	6.90	5.70	4.55	—
5	3600	15.5	13.5	8.20	6.76	5.41	—
	1800	16.6	14.4	8.74	7.21	5.78	—
	1200	18.2	15.8	9.59	7.91	6.32	—
	900	18.3	15.9	9.60	7.92	6.33	—
7-1/2	3600	22.4	19.5	11.8	9.79	7.81	—
	1800	24.7	21.5	13.0	10.7	8.55	—
	1200	25.1	21.8	13.2	10.9	8.70	—
	900	26.5	23.0	13.9	11.5	9.19	—
10	3600	29.2	25.4	15.4	12.7	10.1	—
	1800	30.8	26.8	16.3	13.4	10.7	—
	1200	32.2	28.0	16.9	14.0	11.2	—
	900	35.1	30.5	18.5	15.2	12.2	—
15	3600	41.9	36.4	22.0	18.2	14.5	—
	1800	45.1	39.2	23.7	19.6	15.7	—
	1200	47.6	41.4	25.0	20.7	16.5	—
	900	51.2	44.5	26.9	22.2	17.8	—
20	3600	58.0	50.4	30.5	25.2	20.1	—
	1800	58.9	51.2	31.0	25.6	20.5	—
	1200	60.7	52.8	31.9	26.4	21.1	—
	900	63.1	54.9	33.2	27.4	21.9	—
25	3600	69.9	60.8	36.8	30.4	24.3	—
	1800	74.5	64.8	39.2	32.4	25.9	—
	1200	75.4	65.6	39.6	32.8	26.2	—
	900	77.4	67.3	40.7	33.7	27.0	—
30	3600	84.8	73.7	44.4	36.8	29.4	—
	1800	86.9	75.6	45.7	37.8	30.2	—
	1200	90.6	78.8	47.6	39.4	31.5	—
	900	94.1	81.8	49.5	40.9	32.7	—
40	3600	111	96.4	58.2	48.2	38.5	—
	1800	116	101	61.0	50.4	40.3	—
	1200	117	102	61.2	50.6	40.4	—
	900	121	105	63.2	52.2	41.7	—
50	3600	138	120	72.9	60.1	48.2	—
	1800	143	124	75.2	62.2	49.7	—
	1200	145	126	76.2	63.0	50.4	—
	900	150	130	78.5	65.0	52.0	—
60	3600	164	143	86.8	71.7	57.3	—
	1800	171	140	90.0	74.5	59.4	—
	1200	173	150	91.0	75.0	60.0	—
	900	177	154	93.1	77.0	61.5	—
75	3600	206	179	108	89.6	71.7	—
	1800	210	183	111	91.6	73.2	—
	1200	212	184	112	92.0	73.5	—
	900	222	193	117	96.5	77.5	—
100	3600	266	231	140	115	92.2	—
	1800	271	236	144	118	94.8	23.6
	1200	275	239	145	120	95.6	24.2
	900	290	252	153	126	101	24.8
125	3600	—	292	176	146	116	—
	1800	—	293	177	147	117	29.2
	1200	—	298	180	149	119	29.9
	900	—	305	186	153	122	30.9
150	3600	—	343	208	171	137	—
	1800	—	348	210	174	139	34.8
	1200	—	350	210	174	139	35.5
	900	—	365	211	183	146	37.0
200	3600	—	452	257	226	181	—
	1800	—	458	265	229	184	46.7
	1200	—	460	266	230	184	47.0
	900	—	482	279	241	193	49.4
250	3600	—	559	338	279	223	—
	1800	—	568	343	284	227	57.5
	1200	—	573	345	287	229	58.5
	900	—	600	347	300	240	60.5
300	1800	—	678	392	339	271	69.0
	1200	—	684	395	342	274	70.0
400	1800	—	896	518	448	358	91.8
500	1800	—	1110	642	555	444	116

① 380V 50 Hz.

Single-Phase AC Motors

***Table 430-148*. Full-Load Currents in Amperes, Single-Phase Alternating-Current Motors**

The following values of full-load currents are for motors running at usual speeds and motors with normal torque characteristics. Motors built for especially low speeds or high torques may have higher full-load currents and multispeed motors will have full-load current varying with speed, in which case the nameplate current ratings shall be used.

The voltages listed are rated motor voltages. The currents listed shall be permitted for system voltage ranges of 110 to 120 and 220 to 240V.

hp	115V	200V	208V	230V
1/6	4.4	2.5	2.4	2.2
1/4	5.8	3.3	3.2	2.9
1/3	7.2	4.1	4.0	3.6
1/2	9.8	5.6	5.4	4.9
3/4	13.8	7.9	7.6	6.9
1	16	9.2	8.8	8
1-1/2	20	11.5	11	10
2	24	13.8	13.2	12
3	34	19.6	18.7	17
5	56	32.2	30.8	28
7-1/2	80	46	44	40
10	100	57.5	55	50

Three-Phase AC Motors

The following values of full-load currents are typical for motors running at speeds usual for belted motors and motors with normal torque characteristics.

Motors built for low speeds (1,200 RPM or less) or high torques may require more running current and multispeed motors will have full-load current varying with speed. In these cases the nameplate current rating shall be used.

The voltages listed are rated motor voltages. The currents listed shall be permitted for system voltage ranges of 110 to 120, 220 to 240, 440 to 480 and 550 to 600V.

DC Motors

***Table 430-147*. Full-Load Current in Amperes, Direct-Current Motors**

The following values of full-load currents are for motors running at base speed.

Note: These are average direct-current quantities.

hp	Armature Voltage Rating ②		Ampere Capacity of Fuses for Motors	
			Recommended Values	
	120V	240V	120V	240V
1/4	3.1	1.6	5	3
1/3	4.1	2.0	5	3
1/2	5.4	2.7	7	3
3/4	7.6	3.8	10	5
1	9.5	4.7	15	7
1-1/2	13.2	6.6	20	10
2	17	8.5	25	12
3	25	12.2	30	15
5	40	20	50	25
7-1/2	58	29	80	40
10	76	38	100	50
15	—	55	—	75
20	—	72	—	100
25	—	89	—	125
30	—	106	—	150
40	—	140	—	200
50	—	173	—	250
60	—	206	—	275
75	—	255	—	350
100	—	341	—	500
125	—	425	—	600
150	—	506	—	—
200	—	675	—	—

② These are average direct-current quantities.

***Table 430-150*. Full-Load Current Three-Phase Alternating-Current Motors**

hp	Induction Type Squirrel-Cage and Wound-Rotor Amperes							Synchronous Type Unity Power Factor ① Amperes			
	115V	200V	208V	230V	460V	575V	2300V	230V	460V	575V	2300V
1/2	4.4	2.5	2.4	2.2	1.1	.9	—	—	—	—	—
3/4	6.4	3.7	3.5	3.2	1.6	1.3	—	—	—	—	—
1	8.4	4.8	4.6	4.2	2.1	1.7	—	—	—	—	—
1-1/2	12.0	6.9	6.6	6.0	3.0	2.4	—	—	—	—	—
2	13.6	7.8	7.5	6.8	3.4	2.7	—	—	—	—	—
3	—	11.0	10.6	9.6	4.8	3.9	—	—	—	—	—
5	—	17.5	16.7	15.2	7.6	6.1	—	—	—	—	—
7-1/2	—	25.3	24.2	22	11	9	—	—	—	—	—
10	—	32.2	30.8	28	14	11	—	—	—	—	—
15	—	48.3	46.2	42	21	17	—	—	—	—	—
20	—	62.1	59.4	54	27	22	—	—	—	—	—
25	—	78.2	74.8	68	34	27	—	53	26	21	—
30	—	92	88	80	40	32	—	63	32	26	—
40	—	120	114	104	52	41	—	83	41	33	—
50	—	150	143	130	65	52	—	104	52	42	—
60	—	177	169	154	77	62	16	123	61	49	12
75	—	221	211	192	96	77	20	155	78	62	15
100	—	285	273	248	124	99	26	202	101	81	20
125	—	359	343	312	156	125	31	253	126	101	25
150	—	414	396	360	180	144	37	302	151	121	30
200	—	552	528	480	240	192	49	400	201	161	40
250	—	—	—	—	302	242	60	—	—	—	—
300	—	—	—	—	361	289	72	—	—	—	—
350	—	—	—	—	414	336	83	—	—	—	—
400	—	—	—	—	477	382	95	—	—	—	—
450	—	—	—	—	515	412	103	—	—	—	—
500	—	—	—	—	590	472	118	—	—	—	—

① For 90 and 80 percent power factor, the above figures shall be multiplied by 1.1 and 1.25 respectively.

Notes

Product	Catalog Number	Price U.S. $

Field Sales Contact:

Name: _____

Address: _____

_____

_____

_____

Phone: _____

Fax: _____

Email: _____

Business Card

Distributor Contact:

Name: _____

Address: _____

_____

_____

_____

Phone: _____

Fax: _____

Email: _____

Business Card